

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

MAY 2, 2007

DRAFT

MEETING MINUTES

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LIST OF ACRONYMS AND ABBREVIATIONS

AET	Apparent Effects Threshold
ALCU	Aquatic Lands Cleanup Unit (formerly known as SMU)
AWA	Area-weighted average
BCOC	Bioaccumulative chemicals of concern
BMP	Best Management Practices
BT	Bioaccumulation trigger
BTEX	Benzene, toluene, ethylbenzene, xylene analysis
CAD	Confined Aquatic Disposal
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
COC	Contaminant/Chemical of Concern
COE	Corps of Engineers
CRADA	Cooperative Research and Development Agreement
CSMP	Cooperative Sediment Management Program (Washington State)
cy	cubic yard(s)
DDT	Dichloro-diphenyl-trichloroethane
DL	Detection Limit
DMEF	Dredged Material Evaluation Framework
DMMP	Dredged Material Management Program
DO	Dissolved Oxygen
DOE	Washington State Department of Ecology
Ecology	Washington State Department of Ecology
EDC	Endocrine disrupting chemicals
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
ENR	Enhanced Natural Recovery
EPA	U.S. Environmental Protection Agency
ERDC	Environmental Resources Development Center (formerly known as WES)
ESA	Endangered Species Act
GP	Georgia Pacific Corporation
IDW	Inverse-Distance Weighted
IM	Information management
ISIS	Integrated Site Information System
LAET	Lowest Apparent Effects Threshold
MDL	Method Detection Limit
ML	Maximum level
MTCA	Model Toxics Control Act
MWAC	Middle Waterway Action Committee
NEPA/EIS	National Environmental Policy Act/Environmental Impact Statement
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Association
NPDES	National Pollutant Discharge Elimination System
NWRDT	Northwest Regional Dredging Team
ODEQ	Oregon Department of Environmental Quality
PAH	Polycyclic aromatic hydrocarbon
PBDE	Polybrominated diphenyl ether
PCB	Polychlorinated biphenyl
PEC	Probable effects concentration
Ppb	parts per billion
PSAMP	Puget Sound Ambient Monitoring Program
PSAT	Puget Sound Action Team
PSDDA	Puget Sound Dredged Disposal Analysis
PSI	Puget Sound Initiative
PSNS	Puget Sound Naval Shipyard
PSR	Pacific Sound Resources
PSWQAT	Puget Sound Water Quality Action Team
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial investigation/feasibility study
RL	Reporting limit
ROD	Record of Decision
RSET	Regional Sediment Evaluation Team
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SEDQUAL	Sediment Quality Information System
SL	Screening level
SMARM	Sediment Management Annual Review Meeting
SMS	Sediment Management Standards
SMU	Sediment Management Unit (now, ALCU)
SPI	Sediment profile imagery
SUA	Site Use Authorization
SVOC	Semi-volatile organic compound
SVPS	Sediment vertical profile system
TBT	Tributyltin
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
WDFW	Washington State Department of Fish and Wildlife
WDNR	Washington State Department of Natural Resources
WES USACE	Waterways Experiment Station (now ERDC)

SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING MINUTES

The Cooperative Sediment Management Program (CSMP) held its annual review of dredging, disposal, and sediment management issues on May 2, 2007. The 2007 Sediment Management Annual Review Meeting (SMARM) was hosted by the Seattle District Corps of Engineers and held at the Federal Center South in Seattle, Washington. The Dredged Material Management Program (DMMP) is an interagency cooperative program that includes the Seattle District U.S. Army Corps of Engineers (USACE); the U.S. Environmental Protection Agency (EPA), Region 10; the Washington Department of Natural Resources (DNR); and the Washington Department of Ecology (Ecology). The public issues summary, meeting agenda, list of attendees, and the PowerPoint presentations of the speakers are included as Attachments 1, 2, 3, and 4 respectively.

WELCOME AND OPENING REMARKS

Wayne Wagner, USACE, Seattle District, convened the meeting with welcoming remarks and thanked the sponsors, DMMP and the Sediment Management Unit (SMU), the moderator, and the lead agency, USACE. He reminded the audience of the objectives and purpose of SMARM:

- Obtain public input on proposed changes to the DMMP Management Plans through Issue Papers and Clarification Papers.
- Discuss disposal site management actions and changes.
- Present a summary of Ecology Cleanup Activities.
- Present a summary of EPA Regional Cleanup Activities.
- Review recent past project testing activities, and obtain public input on proposed changes to the DMMP.
- Presentation and discussion of Public Issue Papers.
- Comment on and discuss Status Reports of ongoing actions of DMMP and SMU Program.

Mr. Wagner urged those with comments on Public Issues and Sediment Management Standards (SMS) issues to fill out a card at the back of the room. Comments needed to be submitted by

June 2, 2007, to be discussed in the next SMARM. He then introduced Colonel McCormick for the opening remarks.

“Good morning, my name is Michael McCormick. I have the distinct pleasure of commanding the Seattle District, U.S. Army Corps of Engineers. Welcome to the 19th annual review meeting for the Dredged Material Management Program (DMMP). The Term DMMP and the title of this meeting have a bit of an identity crisis given that DMMP was formerly known as the Puget Sound Dredged Disposal Analysis (PSDDA “pizz-duh”) Program, and for the last 12 years this meeting has been held jointly with the Washington State Sediment Management Standards Annual Review. So I come here a little confused as to what acronym to use. I trust you all know which acronym you are here for and I will leave it at that.

Nineteen years of sharing resources and decision-making, adaptive management and flexibility have all contributed to the sustained success of the Dredged Material Management Program. Updating the Puget Sound, Grays Harbor, Willapa Bay and Columbia River management plans through the Sediment Management Annual Review Meeting has kept the program relevant in terms of addressing technical refinements and policy changes necessary to ensure the proper balance of environmental sustainability with the economic vitality brought by maritime navigation and global trade. The continuing success of this model program has been due in part to the active and continued participation of people like you.

The DMMP agencies are continually challenged to balance limited resources to find solutions for complex technical and policy issues emerging in the region such as PCB contamination, dioxin, fire retardants (PBDEs), and phthalates. Also in concert with the goals of the Puget Sound Initiative, the DMMP agencies are looking for ways to promote policies that streamline the use of dredged material as a resource for habitat restoration and cleanup projects.

It is vital that we continue to promote the protection and cleanup of the aquatic environment, including safeguarding threatened and listed endangered species and marine fisheries, especially in light of the recent listing of Orca and the pending listing of Steelhead. At the same time we must promote and protect commerce and navigation, which are so critical to the economy of the Northwest, by maintaining navigation channels and marinas and allowing for construction and maintenance of necessary Port facilities. Indeed, environmental sustainability and economic

development are not mutually exclusive, and symbiotic smart choices in both arenas is the way of the future.

I know you will have a productive meeting and urge your continued interest and active participation in supporting the DMMP in searching for solutions to the many complex dredging and sediment management issues facing us today.”

Wayne Wagner introduced an addition to the agenda: a memorial to acknowledge the loss of a well known and respected associate in the sediment community. David Kendall took a moment to honor the memory of John Lunz, and to talk about his life and accomplishments. He will be missed.

Mr. Wagner introduced the panel:

- David Kendall (COE)
- Sarah Dzinbal (WDNR)
- Chance Asher (Ecology)
- Michael Szerlog (USEPA)

He finished by saying that time for questions would be provided after the speakers had presented. He then introduced David Fox as the next speaker to begin the Agency Reports segment of the meeting.

Slides

PP0.1	19 th Sediment Management Annual Review Meeting
PP0.2	2007 SMARM
PP0.3	Meeting Objectives and Purpose
PP0.4	Meeting Objectives and Purpose (continued)
PP0.5	Summary and Closing
PP0.6	John Lunz Memorial

AGENCY SUMMARY REPORTS

1. Summary of DMMP Testing Activities (David Fox, Corps).

David Fox began by introducing himself as a member of the US Army Corps of Engineers Dredged Material Management Office and explaining that the dredging year 2007 is defined as June 16, 2006 through June 15, 2007. He covered some of the DMMP basics for new folks including testing procedures and triggers for further testing, suitability determinations, and the recency guidelines that define how long a dredger has to complete dredging after the suitability determination has been made. He then presented a project summary and map of the Dredge Year 2007 suitability determinations, touching on recency extensions, on-going projects, volume summaries, and suitability determinations (Slide 1.12). (A question was asked from the audience about projects listed on this slide designated as “no-test” projects. Mr. Fox explained that Christiansen Shipyard fell under the “greater than 80% coarse material exemption” and the Nickels Brothers site was exempt under “small projects”). Mr. Fox presented slides summarizing unsuitable projects, large projects, and dioxin testing (required in specific areas) (Slides 1.13-1.16). Eight projects required dioxin testing in the DY 2007 near chlor-oxide pulp mills or wood treatment processing plants (Slide 1.17). Current issues include a dioxin evaluation framework, freshwater guidelines through the Regional Sediment Evaluation Team (RSET), and post-dredge testing for projects with aggregate and stabilized side slopes. Mr. Fox said that RSET freshwater guidelines had already been used in the Renton Seaplane suitability testing for beneficial reuse and in another project on the Columbia River. There have been difficulties with post-dredge testing. The stabilized side slopes with rip-rap are difficult to test and remediate. Mr. Fox concluded by directing the audience to sources for more information such as the latest chemicals of concern (COC), bioaccumulative chemicals of concern (BCOC), suitability determinations, and, soon, an updated user’s manual.

Slides

- PP1.1 Sediment Management Annual Review Meeting
- PP1.2 Dredging Year 2007 Definition
- PP1.3 DMMP Testing Procedures
- PP1.4 Suitability Determination

PP1.5	Recency Guideline
PP1.6	Dredging Year 2007 Project Summary
PP1.7	DY07 Project Locations
PP1.8	DY07 Suitability Determinations
PP1.9	DY07 Recency Extensions
PP1.10	Ongoing Projects
PP1.11	Dredging Year 2007 Volume Summary
PP1.12	Dredging Year 2007 Suitability Determinations
PP1.13	Dredging Year 2007 SD: Unsuitable Material
PP1.14	Dredging Year 2007 SD: Large Projects
PP1.15	Dredging Year 2007 Ongoing Projects
PP1.16	Dioxin Testing
PP1.17	Dredging Year 2007 Dioxin Testing
PP1.18	Current Issues
PP1.19	For more DMMP information

2. 2006 DNR Summary of Disposal and Monitoring Activities (Courtney Wasson, DNR).

Courtney Wasson introduced herself as the “somewhat new” Dredge Program Manager for the Department of Natural Resources and said she would be presenting the monitoring framework, the findings from the monitoring events, and recommendations made by SAIC. Her discussion of 2006 disposal and full-monitoring activities at Port Gardner began by presenting the three DMMP questions that are triggered by 500,000 cubic yards (cy) disposal volume:

- 1- Does dredged material remain onsite?
- 2- Have biological effects conditions been exceeded?
- 3- Are there adverse effects to offsite biological resources?

During the monitoring performed during 2006, some amendments to the task order were needed for tissue collection due to low numbers of sea cucumber. Recent dioxin concerns also triggered additional tissue and trawl sampling. Sediment vertical profile system (SVPS) findings indicated no material outside the dredge material boundary (Slide 2.5). Extensive evidence of

bioturbation, feeding voids, and Stage III was present at most stations. Sediment chemistry results found metals lower than the 1988 baseline and previous monitoring studies. Benzoic acid was detected, but below the screening level. BCOC were all below triggers. Ms. Wasson said there were no major concerns with dioxin/furan to begin with and toxic equivalency quotients (TEQ's) were similar to those found at Anderson-Ketron. Dioxin TEQ values were lower near the center of the disposal site. Tissue dioxin/furan values were highest in crab hepatopancreas tissues. Bioassay tests all passed DMMP non-dispersive disposal site guidelines but benthic analysis results revealed a decrease in arthropods, molluscs, and annelids relative to the 1988 baseline. However, the benthic abundances were similar to abundances observed during the 1990 survey, 1990 benthic abundance depressions were attributed to area-wide effects and not due to dredged material disposal. The benchmark stations would need to be evaluated to confirm that hypothesis for the 2006 survey. The findings answered the three questions:

1. Yes, dredge material remains on site.
2. No, no exceedances were found.
3. No, no adverse effects were found compared to most recent data (but, yes, if compared to baseline data).

Recommendations were made to keep an eye on sea cucumber populations and to revise temporal analysis due to area-wide changes. SVPS should be collected immediately after disposal and before bioturbation begins to get a more clearly defined signature of dredge material. Ms. Wasson added that a full monitoring effort is planned for the Commencement bay site, with dioxin baseline assessments also planned for Commencement bay as well as at Bellingham Bay, and Elliott Bay this summer.

Slides

- PP2.1 2006 Full Monitoring at the Port Gardner PSDDA Site
- PP2.2 Presentation Agenda
- PP2.3 PSDDA Monitoring Framework
- PP2.4 Monitoring Plan Modifications
- PP2.5 SVPS Survey
- PP2.6 SVPS Survey (continued)

PP2.7	2006 Sediment Chemistry
PP2.8	BCOCs
PP2.9	Dioxins/Furans in Sediments
PP2.10	Tissue Chemistry
PP2.11	Dioxins/Furans in Tissue
PP2.12	Bioassays
PP2.13	Benthic Community Analysis
PP2.14	Evaluation of 2006 Monitoring Data
PP2.15	Recommendations
PP2.16	Recommendations (continued)
PP2.17	Recommendations (continued)
PP2.18	Recommendations (continued)
PP2.19	Thank You!

3. Summary of SMS Cleanup and Source Control Activities (Chance Asher, Ecology).

Chance Asher introduced herself as new to the agency, managing the Sediments Unit in the Toxics Cleanup Program (TCP). Her focus of the presentation was been on the Puget Sound Initiative (PSI) work and the Water Quality Program (WQP) and standards. She introduced two other new staff members to the unit working on PSI site management and cleanup: Russ McMillan and Kevin MacLachlan. She said her presentation would discuss aquatic cleanup areas and a new strategy to streamline the cleanup process. Ms. Asher described the PSI goal for Ecology to initiate and complete new clean-ups by 2020. She acknowledged DNR's work on this and believes the efforts will contribute to the overall health of Puget Sound. She presented PSI additional funding and positions and said that the money and staff will enable the program to get involved in impacted areas for cleanup and provide source control to help restore areas that support important natural resources. Clean-up will focus on embayments with natural resources or critical habitat that could be impacted. Streamlining will include a geographic approach to increase efficiency, engagement of stakeholders early to understand the needs as a cooperative partner earlier in the process (a lesson learned from the Bellingham Bay pilot project), and leadership in negotiating agreements. It will also include parallel aquatic and terrestrial phases

of clean-up, baywide sediment characterization at the beginning of investigations, and increased funding.

She described some current projects with their respective agency contacts for requesting additional information:

- a. Fidalgo/Padilla Bay: with natural resources, highly productive habitats, crab and perch nursery grounds, and declining eelgrass beds. Showing a map of the upland sites, she said sediment studies would prioritize and focus on Fidalgo Bay (bay wide) and the lagoon in Padilla Bay. She mentioned the Whitmarsh landfill, which has been closed but is leaching contaminants into the lagoon. Stakeholders include Port of Anacortes, City of Anacortes, and the local tribes.
- b. Port Gamble, with wood waste is causing adverse conditions and sediment toxicity, was occupied by industry for a long time. The site is situated partially on state-owned aquatic lands with highly productive habitat, geoduck, clams, oysters, and declining herring population and eelgrass beds. The aquatic area is impacted by ~17 acres of wood debris. An interim action was completed with the removal of about 2 acres of wood waste and with a thin layer of clean sand placed over ~1 dredged acre to improve the habitat and establish eelgrass. The dredged wood waste was stored upland and they hope to re-use it as compost or other landscaping materials.
- c. Budd Inlet sampling focused on the nature and extent of dioxins, previously found in higher levels near outfalls and berths. Sediment samples were collected for dioxin and SMS analyses and some samples will be archived. Sediment samples were also collected from Capitol Lake.

Ms. Asher went on to discuss source control and the PSI pairing of upland and aquatic clean-up sites. The agency has hired three new staff to deal with the Lower Duwamish Waterway (LDW) and identified Dan Cargill as the person to contact for source control questions. Water quality

will be a cooperative approach since Sediment Management Standards (SMS) mandates that the National Pollutant Discharge Elimination System (NPDES) be addressed in the context of potential impacts to sediment. A new 303(d) policy was published in 2006 and the WQP and TCP worked cooperatively to write a chapter which is dedicated to impaired sediments. This effort has resulted in a policy that is aligned with the SMS and is a key tool for the agency to address recontamination of sediment cleanup sites, new sites, and existing impaired sediments.

She mentioned the Urban Waters Initiative (UWI) and the three programs involved: Hazardous Waste &-Toxics Reductions, Water Quality, and Toxics Clean-up. She explained the issues with the LDW include over 80% impervious surface which led to extensive stormwater run-off with 24 CSOs, hundreds of permitted stormwater facilities and upland clean-up sites, as well as 1300 additional potential hazardous waste generators that are not being regulated. These unknown facilities will be assessed under the UWI.

She briefly covered the Puget Sound Naval Shipyard (PSNS) and said that area-weighted averages (AWA) goals for PCB concentration had not yet been met. Ted Benson should be contacted regarding the statistics. In closing, Ms. Asher discussed a slide on freshwater standards and the need to update and validate reference area criteria and standards.

Slides

- PP3.1 Sediment Management Annual Review Meeting
- PP3.2 Sediment Management Updates
- PP3.3 New Staff
- PP3.4 Cleanup
- PP3.5 Puget Sound Initiative
- PP3.6 Aquatic & Upland PSI Resources
- PP3.7 PSI-Aquatic Cleanup Areas
- PP3.8 PSI - Streamlining Cleanup
- PP3.9 PSI - Fidalgo and Padilla Bays
- PP3.10 PSI - Fidalgo and Padilla Bays (continued)
- PP3.11 PSI - Fidalgo and Padilla Bays (continued)
- PP3.12 Port Gamble Bay
- PP3.13 Port Gamble Bay (continued)

PP3.14	Port Gamble Bay (continued)
PP3.15	Port Gamble Bay (continued)
PP3.16	Port Gamble Cleanup
PP3.17	Potential Upland Reuse
PP3.18	Varying Dimensions
PP3.19	Water Catch Basin
PP3.20	PSI - Port Gamble Bay
PP3.21	Bud Inlet
PP3.22	South Inlet surface samples
PP3.23	South Inlet core samples
PP3.24	South Inlet tissue samples
PP3.25	Capitol Lake Surface Samples
PP3.26	PSI - Bud Inlet
PP3.27	Source Control
PP3.28	Puget Sound Initiative
PP3.29	Cooperative Approach
PP3.30	303(d) Policy
PP3.31	UWI Lower Duwamish
PP3.32	Federal Facilities – Puget Sound Naval Shipyard
PP3.33	Freshwater Standards

4. Regional CERCLA Activities (Sheila Eckman, EPA).

Sheila Eckman introduced herself as the Unit Manager of the Office of Environmental Cleanup EPA Region 10, where most sediment projects under Region 10 Superfund are handled. She provided an update of the last year, saying that Puget Sound moved from a designated regional priority to a national EPA priority, that EPA Region 10 has developed a Puget Sound Toxics Strategy, and the overall goal for cleanup of contaminated sediments is to clean up an additional 200 acres between 2006 and 2011. This work will be coordinated with the Governor's Puget Sound Initiative (PSI).

She summarized EPA Superfund progress in Puget Sound to date which includes several hundreds of acres of contaminated sediment cleanup, millions of cubic yards of contaminated sediment removed, thousands of pilings removed, extensive debris removal, capping, enhanced natural recovery, and habitat mitigation. They have been working on Commencement Bay for twenty years. In 2006, the clean-up of Hylebos head and Thea Foss Waterway and the investigation at Occidental facility were completed. Hylebos head and Thea Foss Waterway are moving into long-term monitoring. Continued source control work and continued monitoring, including bay-wide fish tissue monitoring, are planned. Asarco, which is connected with the Commencement Bay site, is slated for sediment remediation in a phased approach.

The Harbor Island and Elliott Bay update included East Waterway, which has had dredging performed for both clean-up and navigation. There is extensive historical data but the gaps need to be filled. East Waterway is in the process of a Focused RI/FS to complete cleanup. Lockheed in West Seattle is new to Superfund and is at the beginning of RI/FS stage. Sediment cleanup at Todd Shipyards and PSR are complete.

Discussing the LDW as a whole, Ms. Eckman said that EPA was the lead for the site and Ecology would manage the upland source control component. The site has been characterized well and is moving into the Feasibility Study stage. Clean-up objectives and levels are yet to be determined. In 2009, the Feasibility Study by LDWG should be complete. T117 and Slip 4 sediment clean-ups are on hold due to upland source control issues.

Oregon sediment projects related to Portland Harbor include McCormick and Baxter, with construction and sediment capping complete and is now in the monitoring phase.

Regarding freshwater sites, Ms. Eckman briefly covered Quendall Terminal, a National Priority Listing, which is one of the last prime undeveloped properties of Lake Washington. Currently, they are in the process of determining data gaps and site characterization. Lake Roosevelt, part of the Upper Columbia River system, is an EPA site in the RI/FS stage with its source in Canada. Sediment and tissue sampling has been performed.

Ms. Eckman gave a national update on National Academy of Science review of sediment dredging at Superfund sites, with a link to a website with meeting minutes and scope of the

project that includes sites in the Pacific Northwest. In conclusion, Ms. Eckman presented a list of EPA contacts.

Slides

- PP4.1 EPA Region 10 Superfund Sediment Cleanup Update
- PP4.2 EPA Puget Sound Priority
- PP4.3 EPA Superfund Cleanup Progress in Puget Sound to Date
- PP4.4 Update on Sediment Cleanup Projects
- PP4.5 (map)
- PP4.6 Commencement Bay 2007-2008
- PP4.7 (photo)
- PP4.8 Harbor Island/Elliott Bay
- PP4.9 (map)
- PP4.10 Lower Duwamish Waterway Update
- PP4.11 Oregon Sediment Projects
- PP4.12 National Update
- PP4.13 EPA Contacts

Wayne Wagner announced a break.

BREAK

The meeting reconvened and *Wayne Wagner* announced the next group of presentations on the Regional Sediment Evaluation Team (RSET) Update and introduced Stephanie Stirling as the first speaker.

5. REGIONAL SEDIMENT EVALUATION TEAM (RSET) UPDATE

5a. Sediment Evaluation Framework (Stephanie Stirling, Corps).

Stephanie Stirling began by noting the Corps' commitment to safety with a cautionary cartoon on Slide 5a.1. She continued by introducing the Interim Final Sediment Evaluation Framework. She suggested those new to RSET contact her later for more information.

She explained the comprehensive approach to looking at the big picture. The goal is one sampling event or approach to satisfy many agencies and needs. Many technical issues (slide 5a.6) have been addressed by allowing contractors to do the heavy lifting. The budget, however, is in continuing resolution and that is a continuing problem. Policy issues include disagreements among agencies regarding exclusionary guidelines, no-test volumes, and sampling intensity per DMMU. The Interagency Cooperation Plan (ICP) describes tasks for each agency within the context of the Sediment Evaluation Framework during 2007, outlines the schedule for completing remaining tasks, and assigns agency lead for each task. A beta-test is underway to test-drive interagency cooperation among the Corps, EPA, Ecology, USFWS, NMFS and Oregon DEQ. Ms. Stirling said that Puget Sounders may wonder why this is new, but this process has never before been implemented outside of Puget Sound.

The Project Review Group is working on refining processes. There are a large number of projects (48 separate projects, September 2006 to April 2007) that need SAP review, data review, and decision documents. They will use improved technology to streamline the process with the goal of a 30 day review period. As an example of improved use of technology, she said that ftp file transfers would expedite the transfer and sharing of files and documents rather than using regular mail.

Ms. Stirling concluded her presentation by presenting the next steps for RSET, including a Freshwater Sediment Values team, Bioaccumulation Subcommittee, PAH Summit, agency review, public workshops, and updates and revisions to document. Data acquisition for the bioaccumulation subcommittee is a key task to be completed. The PAH summit is needed to answer questions on which PAH parameters to report, impacts, and a consensus on a long-term PAH approach. Workshops in Washington, Oregon and Idaho on the SEF and requirements for chemistry and biological testing will be held prior to revising the document.

5b. Freshwater Guidelines Update (Stephanie Stirling, Corps).

Stephanie Stirling continued on the topic of freshwater sediment guidelines, a long-time RSET goal. She explained that some existing guidelines in state documents lay the groundwork.

Concerns with SEF freshwater guidelines include methodology, the lack of chronic endpoints, inclusion of new data sets (Portland Harbor, Bunker Hill), and the protection of ESA species. The Freshwater Sediment Quality Guidelines Group will be a state-led effort linked to RSET and SEF that includes management and technical teams with participating RSET partners. The technical team is working on linking freshwater data with chemical and biological information. Their responsibilities also include incorporating new data sets, evaluating how to input PAH data and agree on data treatment (for non-detects, hit/no-hit definitions, etc), identifying questions to be answered by trial runs, and finalizing computation methodology. Ms. Stirling presented additional tasks including outreach to stakeholders and the development of reliability parameters that would be acceptable to all agencies. Ms. Stirling reviewed the schedule for this work and provided contact information. She concluded by presenting a picture that gave the message that the path forward may not be paved, and there are blind corners, but progress is being made.

Slides

- PP5.1 RSET/SEF Update
- PP5.2 (cartoon)
- PP5.3 Interim Final Sediment Evaluation Framework
- PP5.4 SEF Philosophy
- PP5.5 Agency Review and Comment
- PP5.6 Technical Issues
- PP5.7 Policy Issues
- PP5.8 Interagency Cooperation Plan (ICP)
- PP5.9 “Beta Test”
- PP5.10 Project Review Group
- PP5.11 Next Steps
- PP5.12 (cartoon)
- PP5.13 Freshwater Sediment Quality Guidelines
- PP5.14 Background
- PP5.15 Concerns with SEF Freshwater Guidelines
- PP5.16 (cartoon)
- PP5.17 Freshwater SQG Group
- PP5.18 Technical Team Tasks

PP5.19 Tasks (continued)
PP5.20 Schedule
PP5.21 Schedule (continued)
PP5.22 (cartoon)
PP5.22 Contact Information
PP5.22 (photo)

Questions/Comments

Question: (unknown person) Are freshwater guidelines published in any document?

Response: Teresa Michelsen, Avocet, said that two sources include a journal publication and a detailed agency report.

Comment: Dave Sternberg, Ecology, made an announcement that Ecology has been looking for bioassay and chemistry datasets not already included in SEDQUAL.

Wayne Wagner announced that the meeting was ahead of schedule and would be adjusted to include David Kendall's summary of clarification papers before lunch.

6. Summary of Clarification Papers proposed for DMMP Implementation (David Kendall, DMMO).

David Kendall introduced himself and outlined the clarification papers for which he would present summaries:

- Dioxin Analysis: Clarification of Sediment Method and Quality Control Procedures
- Chlordane Analysis and Reporting
- Benzoflouranthene Analysis and Reporting; and Management at the Commencement Bay Disposal Site.

Regarding the clarification paper on method and quality control procedures for dioxin sediment analysis, Dr. Kendall said that data analysis procedures are to be specified for PCDD/F to assure defensible data acquisition. Information on a Supplemental Quality Assurance Project Plan (SQAPP) will be available on the DMMO website, providing sediment sampling and holding specifications. The DMMP recommended analytical method is EPA Method 1613B, and the SQAPP specifies method quality control procedures. He added that the DMMP agencies will determine, after initial data review, whether further data validation will be required. Data reporting requirements include reporting of all 17 congeners of interest, including 2,3,7,8-chlorine substituted PCDD/F congeners on a dry-weight basis, as well as tabulated TEQs using the 2005 World Health Organization Toxicity Equivalence Factors (TEFs).

Regarding the clarification paper on chlordane analysis and reporting, Dr. Kendall said that the DMMP agencies propose replacing “alpha-chlordane” with “total chlordane” on the DMMP-COC list for sediments (the SL and BT will remain at 10 and 37 ppb respectively). Analysis of the same list of chlordane components and metabolites in sediment and tissue would be required.

“Total chlordane” would be reported as the sum of the detected concentrations of 5 chlordane components and metabolites. When PCB interference causes one or more of the minor components of chlordane (cis-nonachlor, trans-nonachlor, oxychlordane) to be reported as non-detected at a reporting limit significantly higher than major chlordane constituents (cis- and trans-chlordane), those components would be excluded from the total chlordane summation.

Heptachlor would still be reported separately from total chlordane for comparison to sediment SLs.

The Benzofluoranthene Analysis and Reporting clarification paper was summarized as follows: Benzofluoranthenes on the initial PSDDA list restricted the definition to the sum of the b- and k-isomers; Ecology (1995) SMS promulgated Benzofluoranthenes as sum of b-, k- and j- isomers; and DMMP now proposes to adopt the SMS definition of benzofluoranthenes as the sum of the b-, j-, and k- isomers. The main point was to add j isomers (per the 1995 Ecology SMS criteria).

The DMMP criteria for SL and ML of benzofluoranthenes remains unchanged at 3,200 and 9,900 ppb (dry weight) respectively.

The clarification paper on the Management at the Commencement Bay Disposal Site presented the current cumulative disposal volume of dredged material as 7.9 million cubic yards with a 9 million cubic yard (cy) capacity limit, which triggers a NEPA/SEPA review. As an adaptive management action, Dr. Kendall explained that the DMMP agencies propose moving the target disposal coordinates 565 feet to the SE to dampen the future mound height by 25-30%. The effective date for the coordinate shift will be in June 2007. However, the clarification paper does not address or change the capacity authorized in the existing shoreline permit (e.g., 9,000,000 cy). Dr. Kendall presented graphs of the volume and speed of filling site to its current capacity. Multibeam survey models show a well placed dredge material mound located within the disposal zone (900 foot radius circle).

Slides

- PP6.1 2006 DMMP Clarification Papers
- PP6.2 Clarification Papers
- PP6.3 Dioxin Analysis
- PP6.4 Chlordane Analysis and Reporting
- PP6.5 Chlordane Analysis and Reporting (continued)
- PP6.6 Benzoflouranthene Analysis and Reporting
- PP6.7 Management at the Commencement Bay Disposal Site
- PP6.8 Management at the Commencement Bay Disposal Site (continued)
- PP6.9 Commencement Bay Disposal Site History
- PP6.10 Figure 3 Proposed Disposal Coordinates
- PP6.11 Plan View of Disposal Mound within Disposal zone
- PP6.12 Zoom of 1 to 1
- PP6.13 3 to 1 vertical to horizontal Zoom
- PP6.14 1 to 1 vertical to horizontal Zoom

Mr. Wagner announced that the schedule would be further modified and introduced Jonathan Freedman from the EPA.

7. NEPA/SEPA Evaluation of Commencement Bay Disposal Site (Jonathan Freedman, EPA)

Jonathan Freedman began by saying that his presentation was closely related to David Kendall's clarification paper summary on the Commencement Bay dredged material disposal site. The site is getting close to maximum capacity. The 1988 EIS was based on research and knowledge known at the time, and arbitrary dimensions were assigned based on the selected maximum volume of 9 million cubic yards. The site was predicted to fill by 2028 but the original 'EIS' prediction has turned out to be incorrect. However, the 15-year planning horizon volume of 3.9 million cubic yards forecasted in the EIS was close to the actual amount disposed during that period with 88.4 % of the forecasted volume being disposed. In recent years, there has been an almost exponential increase in the amount of material being disposed of at the site and it is expected to reach its forecasted site capacity 9 million cy maximum volume in 1-2 years. Mr. Freedman gave a background of the monitoring at the site and said that only small amounts of dredged material have been detected migrating out of the target area. Enough material has migrated to consider shifting the target location and reconsidering the mound height. Showing a figure on a 1:1 scale, he mentioned that sediment fate and transport analysis recommended that a shifted target would reduce the mound height but does not change the maximum volume capacity for which the site is permitted.

Due to time constraints, SEPA and NEPA documents on the potential impacts from an increase in site capacity should be done concurrently. However, the requirements and findings of NEPA and SEPA do not match. SEPA will have to be done first, and the DMMP expects the SEPA document would recommend a finding of "no significance," and which could then be used as a platform to proceed with the NEPA documentation.

Slides

- PP7.1 Status Report on Commencement Bay
- PP7.2 Commencement Bay disposal site Historical Facts
- PP7.3 The 800-pound (ton?) gorilla in the Bay
- PP7.4 Long-Term Monitoring
- PP7.5 2006 Mound Height

- PP7.6 Mound height concerns
- PP7.7 DMMP Clarification Paper
- PP7.8 NEPA/SEPA evaluation

Wayne Wagner announced a break for lunch with the meeting to reconvene at 12:45.

BREAK FOR LUNCH

After lunch, Mr. Wagner introduced Fred Felleman from Friends of the Earth for a public comment.

8. Permit Review Process Public Comment (Mr. Felleman, Friends of the Earth)

Fred Felleman thanked the audience for giving him the opportunity to speak and introduced himself as a consultant for Friends of the Earth. He began by asking how many people in attendance were not representing an agency. (About 1/3 of those in attendance raised their hand). He was happy to see non-agency representation at the meeting. His presentation was regarding the T30 dredging project in Elliott Bay. He has had experience with the Corps with Cherry Point BP where the Corps performed an EIS as the result of a lawsuit. He has had practice with trying to assert public interest in the process.

The Port of Seattle, Mr. Felleman said, is trying to expedite the review of permits through designated staff at the Corps and that this expedited process may have compromised the public's opportunity for input. Modifications to the terminal required dredging, but the SEPA EIS is piecemeal and does not properly address the dredging. Furthermore, the notice to the public in East Waterway did not mention that dredging was to be performed in a high priority CERCLA site. Other obstacles to public input were the public comment period, which started December 14 and was over the winter holiday, and the difficulty accessing data. Mr. Felleman said that there were no URLs to sediment characterization data. He mentioned that David Kendall was happy to provide the data when he was contacted, but that data should have been more efficiently provided to the public. In addition, legends provided for the dredge footprint in the Corps Public Notice were not accurate. The legend implied that a portion of the dredged material would go to an upland site but the text stated that dredged material would go to the open water disposal site in Elliott Bay.

Mr. Felleman continued by saying the April 12th deadline has passed and the notice reissued, still with no mention of Superfund status and still with no data provided. Besides the failure to properly notify the public, he said that other agencies were not properly involved. He attended an East Waterway sediment management meeting with King County and they had not heard of this project. The Sediment Evaluation Framework (SEF) is recognizing uncertainty in the DMMU concept and Puget Sound Chinook are PCB laden, yet, this project is being pushed along in a less than accountable way. Mr. Felleman concluded by saying that the deadline has passed and now there is another full year to do this properly. He added that what has been okay historically is not necessarily okay now, and that he thinks DMMP can do better.

Questions/Comments

Question: Heather Trim, People for Puget Sound, said she shares in Mr. Felleman's frustration. If a site is proposed for dredging within a Superfund site, she asked, why wouldn't sampling be tied to the Superfund process? The data that has been collected cannot be used for Superfund assessment – it would be like comparing apples and oranges.

Response: Mr. Felleman deferred the question to someone else. David Kendall stepped in to say there have been numerous discussions on this topic and that the concerns expressed by Fred Felleman and Heather Trim would be formally addressed during the Corps Section 10/404 permit decision document. Commenting on this particular project, he said that a lot of the dredging and testing pre-dated the Superfund status of the site, and that information helped to inform the DMMP about the testing required for Terminal 30 Project during the Tier 1 review.

Question: Mr. Wagner stepped in and said that this is not the time for discussion but that he would like to know what the formal process is to get these questions and issues properly addressed.

Response: David Kendall responded that the permitting process that Mr. Felleman is talking about is separate from the SMARM comment process.

Question: Mr. Wagner wanted clarification of the two processes being referred to – one was the T30 project comment process and the other was the SMARM comment process.

Response: David Kendall said the SMARM comment process focuses on the effectiveness of DMMP testing.

Comment: Heather Trim commented that this is not about a particular project; rather it's about the program.

Comment: Doug Hotchkiss, Port of Seattle, wanted to clarify that King County was notified, and had read, and responded to the SEPA EIS in question. The Superfund Project Manager approved the suitability determination, through several meetings, and data review. He added that the RI/FS and the Dredging SAP are designed to answer different questions and so require different sampling. Superfund asks the question: what is the risk of leaving this material in place? The Dredge SAP asks: what is the risk of open-water disposal? He also mentioned that the values in question fell within the "urban cloud" background levels.

Mr. Wagner reminded everyone that this was a debate for another time.

Comment: Mr. Felleman reminded everyone that the main point of his presentation was that the dredging was not addressed in the SEPA EIS.

Mr. Wagner asked David Kendall to caucus with the panel and said, to Mr. Felleman, he does not want to debate this now, but does not want to dismiss this either.

Comment: Erika Hoffman said there is a formal process now in place requiring the COE to coordinate with EPA/Superfund before issuing any permits for dredging projects located within Superfund sites. EPA gives the COE input on whether dredging can be done and with what qualifications/special conditions. There has been an on-going discussion within the DMMP agencies on how to integrate testing for dredging versus remediation for projects located within clean-up areas. So, DMMP staff understand that there is a real discontinuity when clean-up and navigation dredging projects overlap.

Comment: Mr. Felleman reminded the audience that the urgency, expedited processes, and accelerated schedules are bypassing the public's opportunity to deliberate.

Wayne Wagner said the message is clear and these issues need to be addressed.

Question: Jeff Stern, King County, said that legal requirements for navigation dredging are not adequate for Superfund characterization. When that material is removed, it then literally leaves a hole in trying to answer the Superfund characterization questions. How are the data gaps to be filled?

Response: Jonathan Freedman, EPA, answered by saying that when EPA conducts internal CERCLA coordination (Erika Hoffman referenced the East Waterway as an example of a Superfund versus DMMP scenario), the permittee would be informed if the Superfund program needs to separately conduct post-dredge characterization or whether the Corps and EPA will require it of the permittee.

Comment: Jeff Stern emphasized that a more formal process needs to be established for the sampling approach.

Wayne Wagner wrapped up the discussion by saying that a clear theme has been presented and that the meeting was now back on schedule. He then introduced Erika Hoffman.

DIOXIN ISSUES

9. Interim dioxin approach at the Anderson-Ketron site (Erika Hoffman, EPA).

Erika Hoffman began by saying that the 2006 Anderson-Ketron analysis results for the suitability determination could be found on the DMMP website. She explained that dioxin analysis is rarely performed for the DMMP and only done on an as-needed basis. Suitability determinations involving dioxin are project specific. In the past, the DMMP has utilized a concern level of 15 ppb TEQ. Recognizing that 15 ppb TEQ is not a regulatory standard and does not reflect current knowledge of risk and exposure, the DMMP recognized that it could not be used to determine suitability of the Port of Olympia sediments.

The Port of Olympia proposed to dispose of dredge material at the Anderson-Ketron site, which is fishing and crabbing grounds for the Nisqually tribe. Erika and John Wakeman recognized

that there was not sufficient time to conduct an exhaustive risk assessment for the Anderson-Ketron site. Instead, they performed a screening-level analysis to determine a sediment bioaccumulation trigger (BT) and maximum acceptable benthic tissue level for dioxin to be applied to the Port of Olympia project testing.

Their first effort involved using a risk-based approach. Ms. Hoffman explained that the Anderson-Ketron site is non-despersive and located in 450 feet of water. Conservative estimates of tribal subsistence consumption of Dungeness crab and English sole were used and assumed to be protective of others. The screening risk assessment was a deterministic analysis with several simplifications to impart conservatism. Part one, she explained, was to back-calculate the maximum acceptable dioxin concentration in crab and/or sole using the Tulalip consumption data and assumptions (Slide 9.10). The estimated tissue concentrations in crab and sole associated with one cancer in 100,000 were very low (0.6 pptr TEQ for 100% crab diet and 0.57 pptr TEQ for 100% sole diet) using standard EPA risk equations. These estimated tissue concentrations were strikingly similar to the range of dioxin concentrations measured in bivalve tissues during 2006 monitoring at the Anderson-Ketron site. (John Wakeman interjected here and said that the wrong value was showing on the slide for crab – see slide 9.13 – this has been corrected in the text). The second part of the risk-based screening involved estimating tissue concentrations of dioxin in crabs and fish using area background sediment data. A trophic model was used to estimate dioxin in English sole while dioxin in crab hepatopancreas were extrapolated using BSAFs from a Pacific Northwest study. Since sediment dioxin concentrations both onsite and off-site around Anderson-Ketron island were similar, they considered the site average in sediments (3.8 pptr TEQ) as representing “non-urban background values” to which crabs and fish would be exposed over their lifetime. .

The model estimated tissue concentrations were then compared to monitoring data from the Anderson-Ketron site as well as other disposal sites and locations. The modeled dioxin values in benthos were 2-3 times higher than those observed at the Anderson-Ketron site. Modeled crab dioxin concentrations fell within the upper range of those observed at other locations in Puget Sound and were higher than crabs monitoring at the Port Gardner site. Modeled English sole concentrations were higher than fish collected from the Port Gardner site and from locations in Elliott Bay. Modeled crab and fish values were 1-2 times higher than the values presented earlier

as associated with unacceptable increased cancer risk of 1 in 100,000. Although this is not a model verification, Erika and John did conclude that while the model could be improved, its results were not unreasonable.

Based on this screening-level assessment, the DMMP concluded that it would not be practical to establish a risk-based BT since it would likely be lower than limits of detection and possibly below non-urban background. The DMMP agencies decided instead to adopt an interim approach to managing risk associated with dioxin at the Anderson-Ketron site. The interim approach is background-based and designed to maintain current dioxin levels in sediments. It involves the following two-tiered comparison, which is a departure from how DMMP typically evaluates contaminants in dredged material:

- 1) Each dredging unit (DMMU) is compared to the Anderson-Ketron site maximum (7.3 ppt TEQ). Any DMMU with a total TEQ greater than 7.3 ppt TEQ would be unsuitable;
- 2) The remaining DMMUs used to derive a volume-weighted average TEQ and this is compared to the site-wide mean of 3.8 ppt TEQ.

Erika said the next steps would be to collect more dioxin data including sediment, benthos, English sole, and crab at three disposal sites. Anticipated revisions to the screening-level assessment include revised trophic models, improved biota/sediment accumulation factors (BSAFs) based on collected site data, and reconsideration human and ecological exposure assumptions .

Slides

- PP9.1 An Interim Dioxin Approach for the Anderson-Ketron Site
- PP9.2 DMMP's Dioxin Approach
- PP9.3 The Case Study
- PP9.4 Disposal Site (map)
- PP9.5 The Goals
- PP9.6 Conceptual Food Web for Dioxin
- PP9.7 Tribal consumption
- PP9.8 Fish food

- PP9.9 Screening risk assessment
- PP9.10 Screening risk assessment – part 1
- PP9.11 Screening risk assessment – part 1 (continued)
- PP9.12 Screening risk assessment – part 2
- PP9.13 Screening risk assessment – part 2 (continued)
- PP9.14 The outcome
- PP9.15 Risk Management
- PP9.16 What next?

10. Status Report on Dioxin Stakeholders Workshops (Laura Inouye, Ecology).

Laura Inouye introduced herself as representing the Washington State Department of Ecology for the dioxin workshops. They are revising procedures relative to dioxin in dredged material and have just sent out a fact sheet and questionnaire asking for stakeholder input. She said her presentation would give a project overview and discuss future steps. The purpose of workshops, Dr. Inouye said, was to address dioxins and the need for dredging by developing dioxin guidance for DMMP disposal sites. Navigational dredging, conducted frequently in port, harbor and marina areas for maintenance and new work, resulted in about 20 million cy between 2000 and 2006. It is critical to the state economy to facilitate continued dredging and maintain availability of open-water disposal sites while protecting the health of Puget Sound.

Dr. Inouye began an overview of dioxins and furans in the DMMP program from 1991-2006, explaining that dioxin testing was on a “reason to believe” basis only with not many sites tested, site-specific decisions and risk based criteria were used (a TEQ was developed for Grays Harbor in 1991). She explained that the molecular structure of dioxin had positions where chlorine can be substituted. In addition to industrial sources of the chemicals, dioxins can also be formed by burning material in the presence of chlorines. The most toxic of the group is 2,3,7,8-TC DD which is used as the basis for the Toxicity Equivalency Quotient (TEQ) normalization.

Recently, risk assessment was based on trophic modeling and tribal consumption rates (at the Anderson-Ketron site). The risk-based values were well below limits of detection and area

background and are therefore impractical for interim use. The interim approach was developed based on maintaining current “background” dioxin levels in vicinity of disposal site. The values are site-specific but the approach can be applied to develop interim dioxin values for other open-water non-dispersive sites.

Currently, the DMMP approach for dioxins for dispersive sites is that interim dioxin values will rely on comparison to a nearby reference site. The values will be site and project specific with no change for Grays Harbor. Initial stakeholder reactions to the interim approach included concern that the feasibility of navigation dredging could be significantly impacted and concern that an appropriately conservative approach be used. The Dioxin Stakeholder Workshops are being organized by DMMP to get broad stakeholder input, to identify and explore options for dioxin. The expected output of workshops will be recommendations to management incorporating public feedback. Agency management (Ecology/Corps/EPA/DNR) will participate in facilitated deliberation and decision making for proposed programmatic revisions. She went over the details of the workshops including a questionnaire to request input, the anticipated level of participation for workshops, open technical workshops for stakeholder input on background and risk-based approaches, and government-to-government meetings with affected Tribes.

Stakeholders they have identified include Ports, Navy, Coast Guard, marinas and others with dredging needs as well as tribes (fishers and subsistence consumers), local government agencies, public and environmental groups, commercial and recreational fishers, and State/Federal agencies (including RSET). She said that the initial issues include background versus risk approaches; improvements on a risk-based approach; site-specific versus area background approaches; the use of reference, rural, or urban background levels approaches for dispersive versus non-dispersive disposal sites; and evaluating acceptable adverse effects at non-dispersive sites.

She explained that workshop input will be summarized and an analysis of the issues will be performed. The data will be used to provide recommendations to management and to support a decision for proposed evaluation framework on dioxin in dredged sediments. The proposed evaluation framework will undergo a SMARM or SMARM-like process for approval at or before SMARM 2008.

In conclusion, Dr. Inouye introduced Kate Snider, of Floyd Snider, who provided information on the DMMO website and timing for the workshops. Kate Snider covered the logistics of the public workshops and said she hopes for stakeholder input, adding that this relates integrally with PSI. A questionnaire is the first step in the process and has been sent to the SMARM list of attendees from last year. Also included in the mailing were Ports members, the marina community, and dredging association members and contractors. Yellow cards at the back of the room include a copy of the notice. Responses are needed by May 31.

The DMMO web portal also provides access to the questionnaire. She emphasized that this will not be the only opportunity for input. This step is more of a survey of interested parties. There will be a formal public meeting (like SMARM or part of SMARM 2008). Ms. Snider said that there are site-specific interim processes in place in the meantime to avoid delays in current projects.

Questions/Comments

Comment: Theresa Michelsen, Avocet, commented that tissue levels at the Rainier site were low because they were from a reference area. Sediment levels were also low. Both were lower than Puget Sound. The differences illustrate that different levels are present for reference, rural, background, and dispersive sites. As chair of bioaccumulation group for RSET, she mentioned the Interim SEF and the process for developing bioaccumulation reference area criteria. She emphasized that this is still in draft form. She encouraged the attendees to participate in RSET if they were interested in bioaccumulation issues with dioxin or other chemicals. Their report should be final by SMARM 2008.

Comment: Kate Snider added that there is some overlap between PSI and RSET so coordination in these areas is important.

Slides

- PP10.1 Status Report on Dioxin Stakeholders Workshops
- PP10.2 Project and Status
- PP10.3 Purpose of Workshops
- PP10.4 Navigation Dredging

- PP10.5 Dioxin Overview
- PP10.6 DMMP and Dioxins (1991-2006)
- PP10.7 DMMP and Dioxins (2006)
- PP10.8 DMMP and Dioxins (2006) (continued)
- PP10.9 DMMP and Dioxins (2006) (continued)
- PP10.10 Initial Stakeholder Reactions to Interim Approach
- PP10.11 Dioxin Stakeholder Workshops
- PP10.12 Dioxin Stakeholder Workshops (continued)
- PP10.13 Identified Stakeholders
- PP10.14 Initial Issues and Options
- PP10.15 Workshop Outcomes
- PP10.16 Web links and Next Steps
- PP10.17 Web links and Next Steps (continued)

Wayne Wagner once again announced that the schedule would be further modified and introduced Tom Gries.

11. Can Sediment Profile Imaging surveys streamline cleanup investigations? (Tom Gries, Ecology).

Tom Gries began by acknowledging his co-authors at Ecology and at Germano and Associates and TerraStat Consulting Group. He explained that his role during the past year has been research-oriented rather than regulatory (DMMP projects or sediment cleanup sites). The goal of his recent work has been to see if sediment profile imaging (SPI) technology—primarily used for monitoring disposal sites, dredged material, or cap placement—might also be used to speed up the cleanup process. SPI technology had not been used at cleanup sites to evaluate the degree of impairment of benthic infaunal communities.

Mr. Gries listed his project goals to determine if SPI can predict sediment quality, to supplement existing data at two different sites, to identify benthic communities that are most likely to be impaired, and to characterize ‘baseline’ conditions using SPI parameters. Two very different

areas were selected for study – the lower two-thirds of the Lower Duwamish Waterway (LDW) and the Port Gamble wood waste site. SPI and sediment quality surveys were conducted at both sites in areas of relatively constant salinity, temperature, and depth.

LDW SPI results alone showed generally oxic bioturbated sediment with epifauna and evidence of deep-dwelling infauna. Port Gamble imagery showed silts and fine sand combined with wood waste at the surface, fewer observable organisms and less bioturbation.

Mr. Gries described the cluster analysis and multidimensional scaling (MDS) that indicated relationships between station groups identified by SPI parameters, and station clusters defined by benthic community results. He used discriminant analysis to identify SPI and other parameters contributing to the differences between benthic community station groups. Regression trees based only on SPI and conventional results were also able to accurately classify stations into different benthic groups identified by cluster analysis and MDS (Slide 11.11).

Mr. Gries concluded that the SPI surveys provided good quality data to identify SPI - sediment quality relationships, fill data gaps, identify potential impairment, and possible ‘baseline’ conditions. But he also said there was no ‘silver bullet’ – there were few strong correlations between SPI or conventional parameters and sediment quality indicators. Multiple variables were essential for describing and explaining differences between benthic communities. His recommendations included conducting SPI surveys more frequently as part of cleanup investigations. Results could be used to characterize sediment structure and stability, benthic habitats and communities, and areas and types of severe disturbance. He suggested using SPI results to predict some conventional sediment parameters and as an indicator of benthic community structure and function, independent of other benthic risk assessment. He cautioned against over-interpreting SPI results – they do not appear to predict unacceptable adverse benthic community effects as defined by the SMS rule. He also noted exceptions in the literature regarding the correct identification of severely disturbed areas using SPI results. The greatest value of SPI for cleanup investigations, he concluded, may be in early identification of a footprint for intensive and costly sediment sampling and analysis. Finally, he suggested that regulators consider using the “latest science” policy e.g., the SPI line of evidence and more indicators of benthic community health, to their advantage.

Questions/Comments

Question: Ann Fitzpatrick, RETEC, asked when the report would be available, and would sediment transport modeling from the results be possible?

Response: Tom Gries, Ecology, said that a draft would be available at the end of May. He said that while reviewing results it occurred to him that there could be a strong link between SPI results and sediment transport modeling results.

Post meeting note. Mr. Gries final reports are available at the following Ecology web site:

www.ecy.wa.gov/biblio/eap.html.

Slides

- PP11.1 Can Sediment Profile Imaging surveys streamline cleanup investigations?
- PP11.2 Acknowledgments
- PP11.3 What is SPI?
- PP11.4 Uses of SPI
- PP11.5 Project Goals
- PP11.6 Approach and Study Design
- PP11.7 (maps)
- PP11.8 Sequenced SPI, Sediment Quality Surveys
- PP11.9 (photo)
- PP11.10 SPI Data
- PP11.11 Analysis
- PP11.12 Results – Contrasting Study Sites
- PP11.13 Results – Cluster Analysis
- PP11.14 Results – Cluster Analysis (continued)
- PP11.15 Discriminant Analysis
- PP11.16 Results
- PP11.17 Conclusions

- PP11.18 Recommendations
- PP11.19 Recommendations (continued)
- PP11.20 Acknowledgments
- PP11.21 Backup Slides
- PP11.22 (graph)
- PP11.23 (graph)
- PP11.24 Methods
- PP11.25 Analysis - Correlation
- PP11.26 Analysis - Regression
- PP11.27 Results – Classification Trees
- PP11.28 Study Costs (per sample)

12. SEDQUAL Redevelopment Updates (Nagesha Kannadaguli, Ecology).

Nagesha Kannadaguli introduced himself and began by explaining the title change from SEDQUAL to EIM, saying that the application can now be used to analyze sediment, upland, groundwater, and environmental data in a variety of ways.

The “MyEIM” portal is a seamless integration of tools and a query builder for multiple comparisons to clean-up criteria. Cross-media/matrix analysis is also possible, such as sediment data analysis that includes neighboring upland data points to identify possible nearby sources. Scenarios can be based on customized clean-up values. Contours can be created and derived values can be calculated (such as toxic equivalency quotients [TEQ’s], various treatments of non-detect values, etc). The units of measurement (UOM) have been expanded and are independent and comparable.

The Internet Explorer 6 version includes centralized tools and data with real-time updates. An account is required if users are not part of Ecology.

Mr. Kannadaguli proceeded to give a tour of the “MyEIM” portal, demonstrating saved queries that included queries by depth, parameter, or dates. He also demonstrated the map query interface. The data values can then be compared to clean-up criteria or user-defined criteria. Various filters can be placed on multiple values, such as filtered by most recent date or

maximum value. User-defined variables include assigned weighting factors. Results can be mapped based on any of these criteria.

Development is only half done for the bioassay portion of the application and will be similar to SEDQUAL functionality.

EIM upload of data will have a few days lag time for data validation to occur. They will also be working on a “sandbox” tool which will allow EIM tools to be used on personal datasets that don’t need to be uploaded and validated through the main EIM database.

Update (July 23, 2007): Key partners of Department of Ecology will be able to manage their own data in EIM, as a replacement for the “sandbox” tool. Requirements for “own data management” will be scoped in fall 2007 in a follow on project of the MyEIM project.

(An unidentified audience member asked what the schedule was).Mr. Kannadaguli said that testing is currently underway and will be on-going. Chemistry should be complete by the beginning of June. Bioassay will then need to be completed and tested. There will be an internal release in June at which time they will gather feedback. Internal training on the tools is planned and Phase 2 will begin in July or August.

Questions/Comments

Question: An unidentified audience member asked what support there would be for maintenance of criteria needed updating.

Response: Mr. Kannadaguli answered that criteria are expected to be maintained but, if not, user-defined criteria can always be used to match any updates.

Question: Michael Szerlog, EPA, asked whether exports to GIS would be possible.

Response: Mr. Kannadaguli suggested he contact Ewan.

Questions/Comments

Wayne Wagner asked for final comments and questions.

Comment: David Kendall began the comment review by reading a comment card by Heather Trim, from People for Puget Sound, saying that any proposed dredging in a Superfund site should be handled within the context of the Superfund sampling strategy. Superfund characterization is being hampered by the current process. Dr. Kendall responded by saying that all comments will be formally addressed in the meeting minutes, including the DMMP versus CERCLA issue. He reminded audience members that they may clarify or add to comments by June 2.

Comment: Tom Gries mentioned a clarification paper from 2005 SMARM (<http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/CleanupVsNavDredge-05.pdf>) that called for coordination when devising Sampling and Analysis Plans for clean-up and navigation combination sites.

Response: David Kendall said that they would consider the broader, historical context of the issue.

Response: Chance Asher added that a response to the MTCA state Superfund comments will also be included from Ecology.

Slides

- PP12.1 Advanced Tools For Environmental Data Analysis
- PP12.2 Agenda
- PP12.3 Project Overview
- PP12.4 New in Phase I
- PP12.5 New in Future Phases
- PP12.6 MyEIM Portal
- PP12.7-12.12 EIM Details

Wayne Wagner closed with a reminder that written comments would be accepted through June 2 for SMS and DMMP issues. He thanked the audience for participating and Ecology for the refreshments.

Meeting was Adjourned

ATTACHMENT 1: DMMP RESPONSE TO PUBLIC ISSUES

DMMP Response to Public Issues Raised at the 2007 SMARM

1. **Comment:** Characterization of sediments associated with navigation or new-work dredging that is proposed to occur within a Superfund Site should be similar (in frequency and depth resolution) to that typically required by Superfund (e.g., 0-10 cm surface and 1-ft intervals for subsurface) (Heather Trim, People for Puget Sound). One rationale for this approach would be to preserve the integrity of sediment data that may be critical in source identification (e.g., near outfalls).

Response: In recent years, both DMMP and cleanup staff have found it increasingly difficult to distinguish whether a dredging project is being conducted for the purpose of navigation, cleanup or both. The DMMP has taken several steps coordinate its decisions with cleanup programs in an attempt to address the discrepancies between sampling/testing performed to determine suitability under the DMMP approach versus that done for purposes of cleanup. However, it is clear from the concern raised during this year's SMARM that the DMMP agencies need to make the ongoing coordination between DMMP and CERCLA / MTCA more transparent in our suitability determinations and other testing documentation.

At the 2005 SMARM, the DMMP presented a clarification paper (<http://www.nws.usace.army.mil/PublicMenu/documents/DMMO/CleanupVsNavDredge-05.pdf>) providing general guidance on how to determine whether or not an evaluation of sediment quality should be conducted a) under the DMMP using its guidelines, b) under a cleanup authority, e.g., CERCLA or MTCA/SMS, using different requirements and guidance, or c) under both types of sediment management programs using a combination of guidelines and requirements. The intent of this clarification paper was to provide a clear justification for coordinating data collection and evaluation between DMMP and clean-up programs.

Since 2002, there has also been a Standard Operation Procedure (SOP) between the COE and EPA which requires the COE to ascertain whether in-water work proposed for COE permitting could affect a current Superfund site. This SOP establishes a formal coordination process between the COE and Superfund and requires EPA's written concurrence prior to issuing any permits or letters of permission for projects located within Superfund sites. The SOP also requires the COE to provide the same notification to the DMMO for their review when the work involves any dredging. Possible Superfund responses can vary from "no objection" to "requiring special conditions to the permit" to requesting that the COE not permit the proposed activity and that it be covered under the remedial action.

In the case of the Port of Seattle Terminal 30 Dredging Project, the DMMP agencies reviewed all of the previous dredging history and testing results (including that performed under Superfund) prior to approving the sampling and analysis plan for this project. Previous dredging events in mid-1980s (prior to CERCLA site designation) removed approximately 100,000 cy of contaminated sediments along the entire T30 pier face down to the native sediment contact layer (Doug Hotchkiss, Port of Seattle, personal communication). Subsequent testing conducted in the Terminal 30 dredging area in 1998 demonstrated low levels of contamination within the T30 dredging area with all material suitable for unconfined-open water disposal. Furthermore, all the surface material retested in 2006 confirmed the suitability of material previously found suitable

in 1998. On the basis of this data review, the entire T30 dredging footprint was found to be suitable under DMMP open-water disposal guidelines. Superfund reviewed and agreed with the DMMP suitability determination, and will require a post-dredge characterization of the top 10 cm of the newly exposed sediment surface for comparison with Sediment Management Standards criteria.

ATTACHMENT 2: AGENDA

2007 Sediment Management Annual Review Meeting Final Agenda

May 2, 2007

Federal Center South, Seattle

Galaxy Conference Room

Hosted by Seattle District Corps of Engineers

Registration and Coffee	8:30-9:00
Opening Remarks to SMARM 2007 (Colonel McCormick, Seattle District Commander)	9:00-9:15
Agency Summary Reports	9:15-11:00
▪ Corps (Summary of DMMP Testing Activities, David Fox, Corps)	
▪ DNR (Summary of DNR Disposal and Monitoring Activities, Courtney Wasson, DNR)	
▪ Ecology (Summary of SMS Cleanup/Source Control Activities, Chance Asher, Ecology)	
▪ EPA (Summary of Regional CERCLA Activities, Sheila Eckman, EPA)	
BREAK	11:00-11:15
Regional Sediment Evaluation Team (RSET) Update	11:15-12:00
▪ Sediment Evaluation Framework Update (Stephanie Stirling, Corps)	
▪ Freshwater Guidelines Update (Stephanie Stirling, Corps)	
LUNCH (on your own)	12:00-1:00
DIOXIN ISSUES	1:00-2:00
▪ Interim dioxin approach at the Anderson-Ketron site (Erika Hoffman, EPA)	1:00-1:20
▪ Status Report on Dioxin Stakeholders Workshops (Laura Inouye, Ecology)	1:20-1:45
Question and Answers on Dioxin Issues Presentations	1:45-2:00
Public Issue Papers	2:00-3:00
BREAK	3:00-3:15
SEDQUAL Redevelopment Updates (Nagesha Kannadaguli, Ecology)	3:15-3:45
Summary of Clarification Papers proposed for DMMP implementation (David Kendall, Corps)	3:45-4:00
Activities of Interest	4:00-4:45
▪ Can Sediment Profile Imaging surveys streamline cleanup investigations? (Tom Gries, Ecology)	
▪ NEPA/SEPA Evaluation of Commencement Bay Disposal Site (Jonathan Freedman, EPA)	
Summary and Closing	4:45-5:00

Deadline for written Comments on SMARM 2007: June 2, 2007

ATTACHMENT 3: LIST OF ATTENDEES

Last Name	First Name	Affiliation	Phone	Email
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**ATTACHMENT 4: POWERPOINT SLIDES FOR EACH SMARM
SPEAKER**



19th SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING



19th Year of Program
Implementation

May 2, 2007

Wayne Wagner, Seattle District
Meeting Moderator





0.1

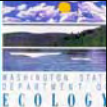



2007 SMARM

- ⌘ Jointly Sponsored by the Dredged Material Management Program (DMMP) and the Sediment Management Standards (SMS) Program
- ⌘ Moderated by the Corps of Engineers (Lead DMMP agency)
- ⌘ **Hosted by Seattle District, Corps of Engineers**






0.2

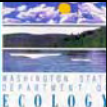



MEETING OBJECTIVES AND PURPOSE

- ⌘ Obtain public input on proposed changes to the DMMP Management Plans through **Issue Papers** and **Clarification Papers**.
- ⌘ Discuss disposal site management actions and changes.
- ⌘ Summary of Ecology Cleanup Activities
- ⌘ Summary of EPA Regional Cleanup Activities






0.3



MEETING OBJECTIVES AND PURPOSE (continued)

- ⌘ Review recent past project testing activities, and Obtain public input on proposed changes to the DMMP.
- ⌘ Presentation and discussion of Public Issue Papers.
- ⌘ Comments and discussion on Status Reports of ongoing actions of DMMP and SMS Program.



0.4



Summary and Closing



⌘ **Public Issues Summary:** Written comments may be submitted on the SMARM proceedings, but must be submitted to the DMMP agencies by **June 2, 2007** for consideration.

⌘ **SMS Issues Summary:** Written comments on SMS issues presented at SMARM may be submitted to SMS for consideration until **June 2, 2007**.



WASHINGTON STATE DEPARTMENT OF
Natural Resources

John David Lunz
June 4th, 1943 – January 1st, 2007
We will always remember your warm smile,
love of the outdoors, inquisitive mind and
kind spirit





SEDIMENT MANAGEMENT ANNUAL REVIEW MEETING

May 2, 2007

Dredging Year 2007 DMMP Testing Activities

David Fox
U.S. Army Corps of Engineers



1.1




Dredging Year 2007 Definition

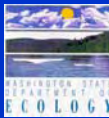
June 16, 2006
to
June 15, 2007






1.2



DMMP Testing Procedures



- **Chemical testing**
 - Standard suite of chemicals of concern
 - COCs in limited areas – e.g. dioxins and TBT
 - Screening levels and bioaccumulation triggers
- **Acute and sublethal bioassays**
- **Bioaccumulation**



1.3



Suitability Determination



- **Memorandum for Record**
- **Summary of sampling and testing activities**
- **Documents the suitability of dredged material for open-water disposal or beneficial use**
- **Signed by all DMMP agencies**



1.4



Recency Guideline



- The length of time for which testing results will be considered representative of the area to be dredged
- Ranking-dependent
- Extensions, typically of one year, are granted on a case-by-case basis



1.5



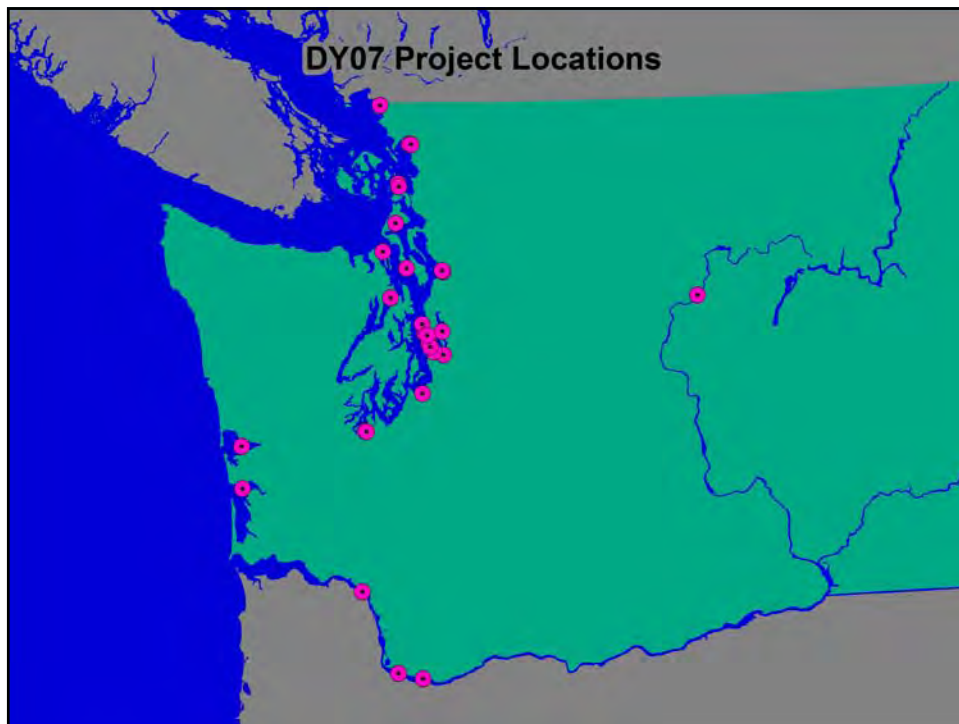
Dredging Year 2007 Project Summary



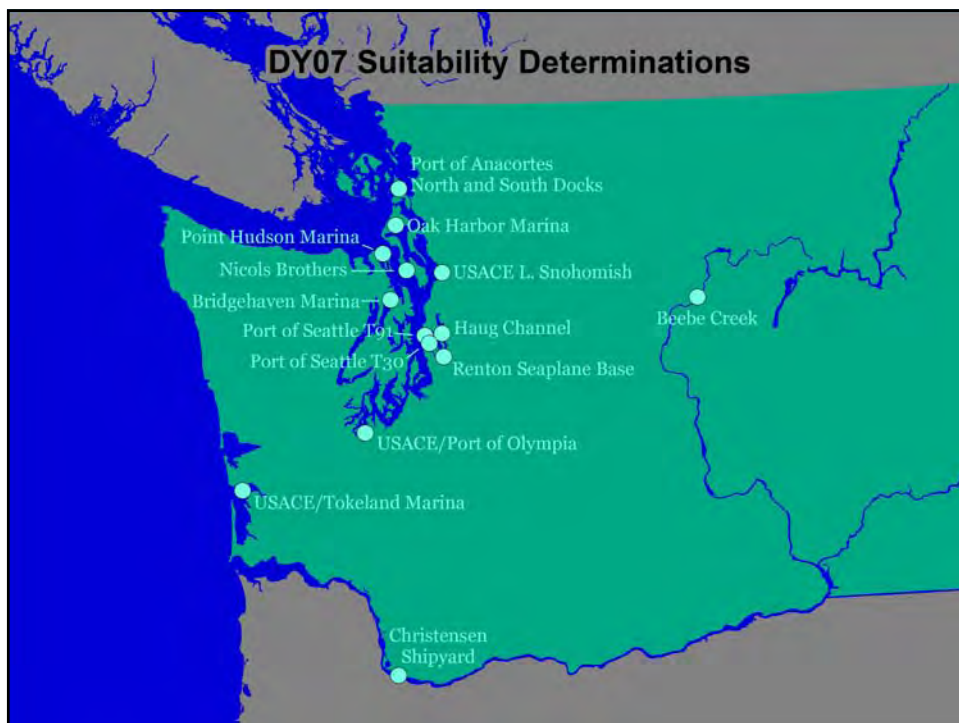
- 30 projects
- 14 suitability determinations (SD)
- 3 recency extensions
- 13 on-going projects



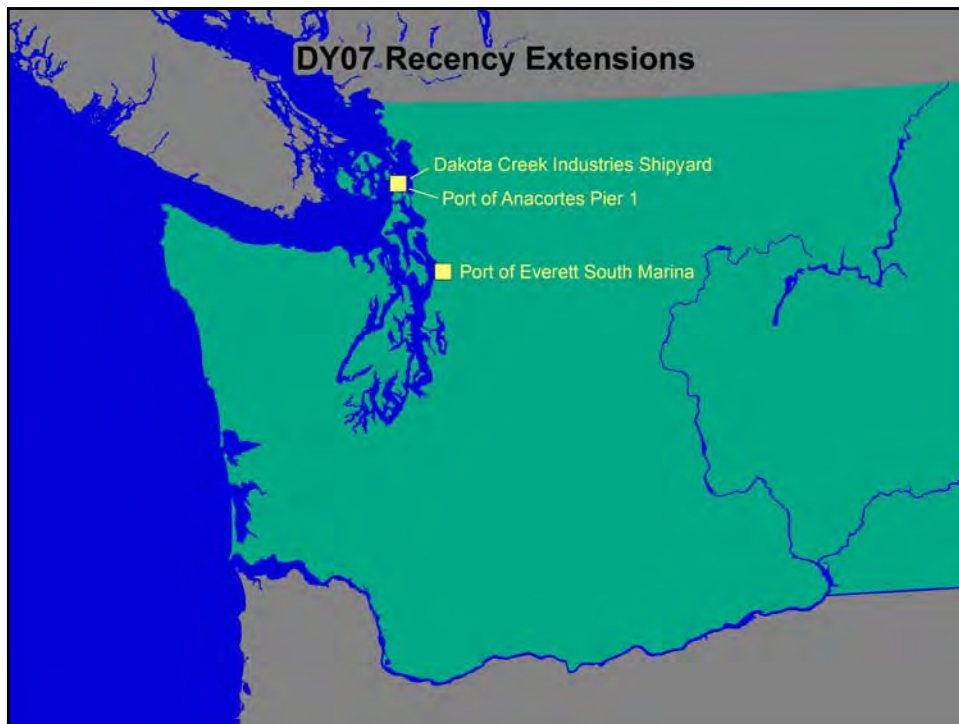
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1.7



1.8



1.9



1.10



1.11



1.12



1.13



1.14



Dredging Year 2007 Large on-going projects



Project	Volume (cy)
Grays Harbor O&M	1,750,000
Port of Tacoma East Blair	1,000,000
Semiahmoo Marina	156,800



1.15



Dioxin Testing



- Required for projects near current or historical sources:
 - chlor-oxide bleach process pulp mills (CO PM)
 - chlor-alkali or chlorinated solvent manufacturing plants (CA/CS MP)
 - former wood treatment sites (WT)
 - phenoxy herbicide use and handling
 - areas with high PCB concentrations



1.16



Dredging Year 2007 Dioxin Testing




Project	Reason to Believe
Port of Anacortes North Dock	CO PM
Port of Bellingham I & J	CO PM
Port of Bellingham Gate 3	CO PM
Grays Harbor O & M	CO PM
Georgia-Pacific Camas Slough	CO PM
Port of Olympia/USACE O&M	WT
Port of Olympia East Marina	WT
Port of Tacoma East Blair	CA/CS MP









1.17



Current Issues



- Dioxin evaluation framework
- Freshwater guidelines (RSET)
- Post-dredge testing
 - Projects with aggregate
 - Stabilized side slopes

1.18



For more DMMP information



<http://www.nws.usace.army.mil>

Click on "Dredged Material Management"



2006 Full Monitoring at the Port Gardner PSDDA Site



Presentation of Results
May 2, 2007

SAIC
From Science to Solutions™

2.1

Presentation Agenda

- Review PSDDA Monitoring Framework
- 2006 Findings
- Dioxin/Furan Results – Dungeness Crab and English Sole
- Recommendations



2.2

PSDDA Monitoring Framework

1. Does dredged material remain onsite?
2. Have biological effects conditions been exceeded?
3. Any adverse effects to offsite biological resources?

2.3

Monitoring Plan Modifications Implemented in 2006

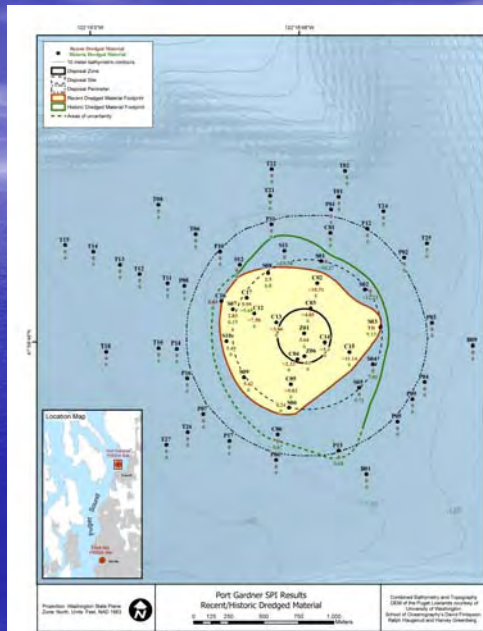
- Sea Cucumber Collections
- Dioxin/Furan Analysis of Sediments and Tissues



2.4

SVPS Survey

- Recent dredged material confined within perimeter
- Dredged material - coarse to medium sand with woody debris
- Ambient sediments are water-rich silt clays



2.5

PGS09/C



Historic DM

PGP04/B



Ambient

2.6

2006 Sediment Chemistry

- Conventional Parameters
 - Generally consistent among station types with exception to grain size
 - High percent fines (>90%) offsite, mean of 61% fines onsite
- Metals
 - Detected at all stations but below SLs
- Organic Compounds
 - Detected compounds found at low or trace levels, well below SLs
 - Benzoic acid detected for first time, below SL

2.7

BCOCs

- List 1 and 2 BCOCs analyzed
- All detected concentrations were below the BTs



2.8

Dioxins/Furans in Sediments

- 2005 WHO TEFs
- Lowest TEQs near site center (PGZ06) and Carr Inlet reference stations
- TEQ range similar to Anderson/Ketron values

Sample ID	Adjusted TEQ, ng/kg (0.5 x QL)	TOC (%)
Port Gardner Sediments (ng/kg DW)		
PGS04	2.59	1.60
PGS08	2.01	1.49
PGZ06	0.740	1.70
PGZ06 (dupl.)	0.705	--
PGT11-A	4.61	1.94
PGT13-A	4.33	2.05
PGT15-A	4.53	2.00
PGB01_10cm	3.64	1.78
PGB09_10cm	3.14	1.70
PGP01_10cm	5.18	2.01
PGP07_10cm	4.02	1.83
PGP08_10cm	4.09	1.86
PGP09_10cm	3.34	1.81
Carr Inlet Sediments (ng/kg DW)		
CR-24	0.784	0.64
CR-23W	0.479	0.37

2.9

Tissue Chemistry

- *Molpadia* sea cucumbers analyzed for BCOCs at transect and benchmark stations.
- All detected concentrations were below the 1988 guidelines values
- Arsenic exceeded TTLs, but comparable to 1988 baseline concentrations.



2.10

Dioxins/Furans in Tissues

Tissue	Adjusted TEQ, ng/kg (0.5 x QL)	% Moisture	% Lipids
<i>Nephtys</i>	0.093 – 0.164	81.4 – 88.0	0.61 – 1.00
<i>Travisia</i>	0.351 – 0.597	84.3 – 87.0	0.29 – 0.44
English Sole	0.278 – 0.573	81.3 – 81.8	1.24 – 1.44
Crab Meat	0.178 – 0.192	78.9 – 81.9	0.40 – 0.57
Crab Hepatopancreas	1.67 – 2.77	75.7 – 80.4	6.08 – 10.9



2.11

Bioassays

- DMMP bioassays conducted on three onsite (PGZ06, PGS04, PGS08) and two Carr Inlet reference stations (CR23W, CR24).
- All bioassays passed DMMP evaluation guidelines.

2.12

Benthic Community Analysis

- Benthic community analysis conducted during 1988 baseline, 1990, and 2006
- In 1990, significant decrease in arthropods and annelids due to region-wide changes
- In 2006, significant decrease in arthropods and molluscs relative to baseline
 - Compared to 1990, only mollusc reduction at farthest transect station (PGT15)

2.13

Evaluation of 2006 Monitoring Data

- Question 1: Does dredged material remain onsite?
- Question 2: Are biological effects conditions exceeded?
- Question 3: Adverse effects to offsite biological resources?

2.14

Recommendations

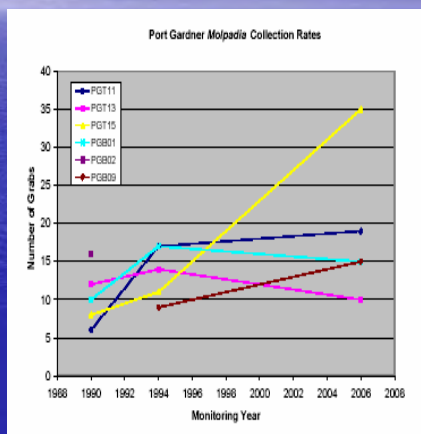
- Tissue Collection for Bioaccumulation Studies
 - Port Gardner study showed that infaunal organisms other than *Molpadia* and *Compsomyx* can be collected for chemical testing.



2.15

Recommendations

- Biological Resources at PGT15
 - *Molpadia* abundance appears to have decreased
 - Decrease in molluscs observed (relative to 1988 and 1990)



2.16

Recommendations

- SVPS Survey Schedule
 - Should be soon after completion of disposal site operations
 - Consistent with historical practices
 - Ensures that the recent DM footprint is clearly delineated



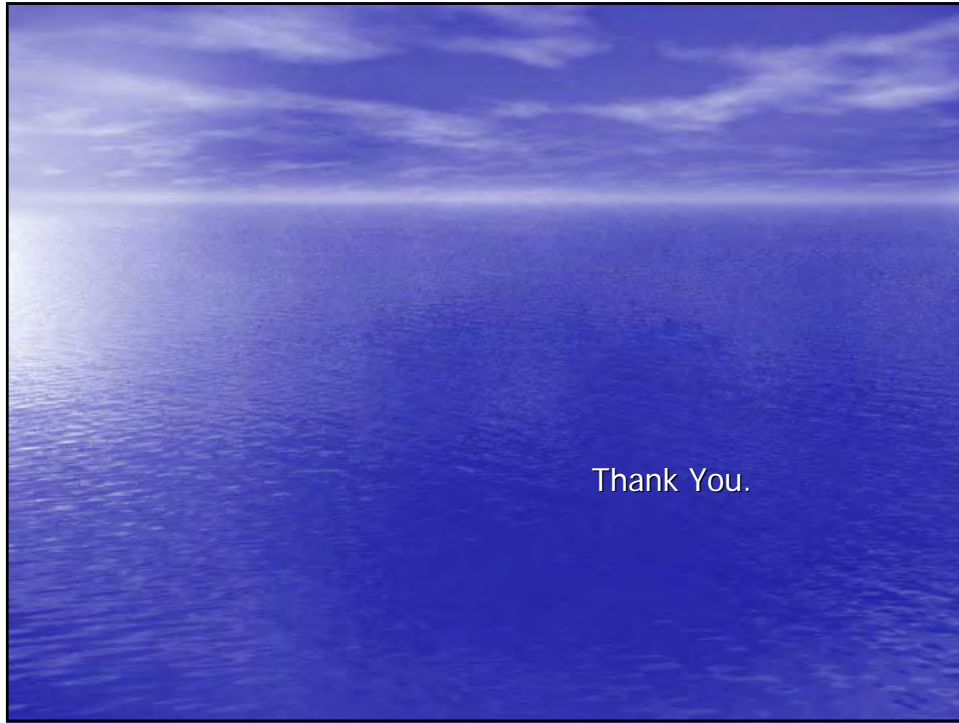
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Recommendations

- Revised Approach for Benthic Evaluation
 - Temporal changes in benthic community structure
 - Different box core processing methods
 - Comparison to baseline (16 years at Port Gardner) may no longer be appropriate
- Option: Comparison to Benchmark
 - Consistent with SMS
 - Removes natural population dynamics
 - Consider analysis of 2006 Port Gardner benchmark samples



2.18



Sediment Management Annual Review Meeting

Washington Department of Ecology

Toxics Cleanup Program
Chance Asher

3.1

Sediment Management Updates

- Cleanup
- Source Control
- Standards

3.2

New Staff – TCP HQ

Russ McMillan



Kevin MacLachlan



3.3

Cleanup

Puget Sound Initiative

- Aquatic cleanup areas
- Streamline cleanup process

3.4

Puget Sound Initiative

- 2005 - 07 planning
- Cleanup by 2020
- Aquatic Upland pairs

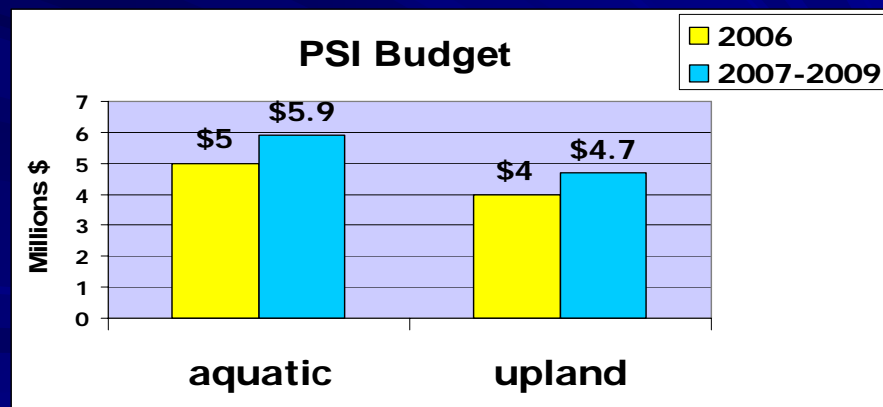


3.5

Aquatic & Upland PSI Resources

Aquatic: 2 new staff

Upland: 6 new staff



3.6

1. Padilla Bay / Fidalgo Bay*
2. Port Gardner / Snohomish River Estuary
3. Port Gamble*
4. Lower Duwamish *
5. Dumas Bay*
6. Budd Inlet*
7. Oakland Bay
8. Port Angeles Harbor



- Geographic approach
- Provide leadership
- Conduct parallel phases of cleanup
- Bay wide sediment characterization
- Engage stakeholders early
- Increased funding

PSI - Fidalgo and Padilla Bays

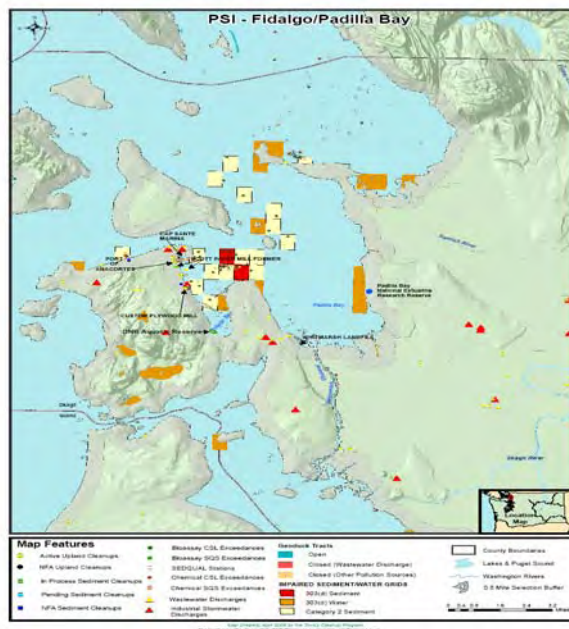
- Support important natural resources
- Highly productive habitat
- Declining eelgrass beds



3.9

PSI - Fidalgo and Padilla Bays

- Bay wide Sediment Study
- Whitmarsh Landfill
- Port of Anacortes sites (5)
- MJB Properties
- Custom Plywood



3.10

PSI - Fidalgo and Padilla Bays

- Sandra Caldwell, Project Coordinator
- Ted Benson/Russ McMillan, Sediment Specialists

3.11

Port Gamble Bay



Point Julia 1870

3.12



3.13

Port Gamble Bay



A LUMBER MILL AT PORT GAMBLE

Scattered here and there throughout Western Washington, hidden in bays and inlets, are little communities of which a lumber mill is the center and the life. Men work and sleep, ships come—load and go—and the saws buzz on forever. For a period of fifty-six years the waste pile at this mill had burned incessantly—without ever dying out. Port Gamble is on the picturesque Hood Canal, thirty-eight miles from Seattle.

3.14



3.15

Port Gamble Cleanup



3.16

Potential Upland Reuse



3.17

Varying Dimensions



3.18

Water Catch Basin



3.19

PSI - Port Gamble Bay

- Kevin MacLachlan – Site Manager
- Russ McMillan – Technical Support

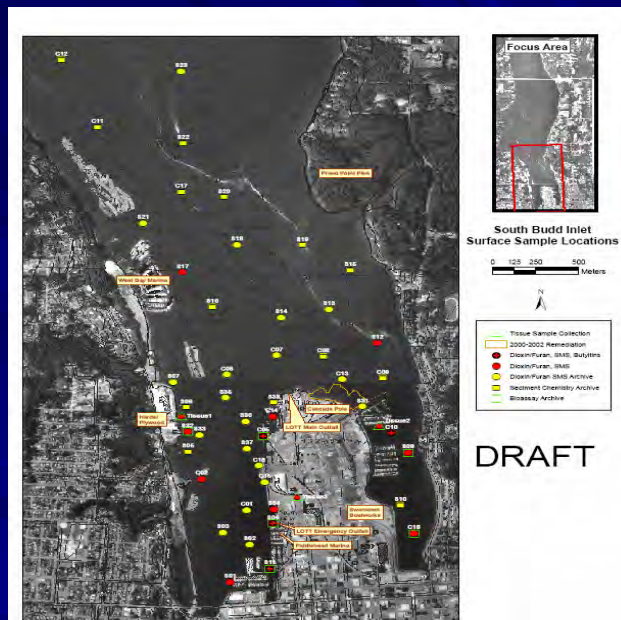
3.20

Budd Inlet

- Elevated levels of dioxins found
- Higher levels near outfalls and berths
- Sediment characterization conducted

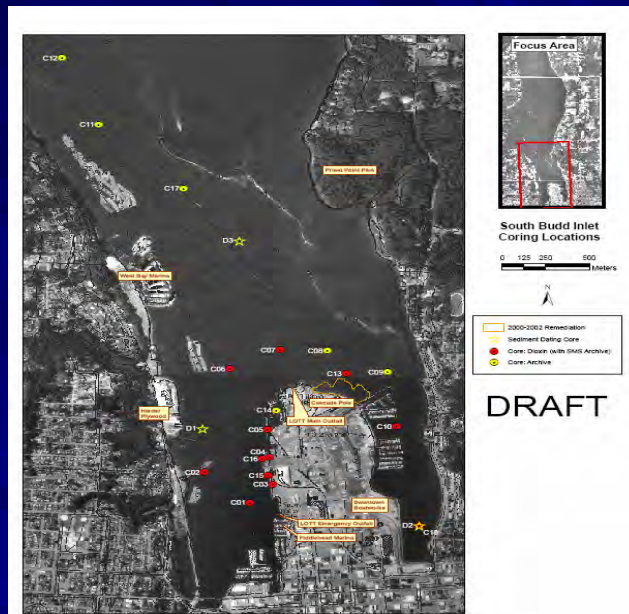
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South Inlet surface samples



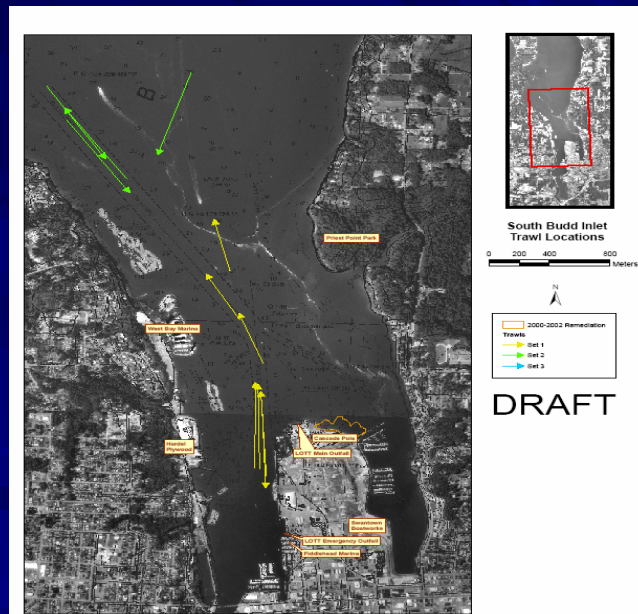
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South Inlet core samples



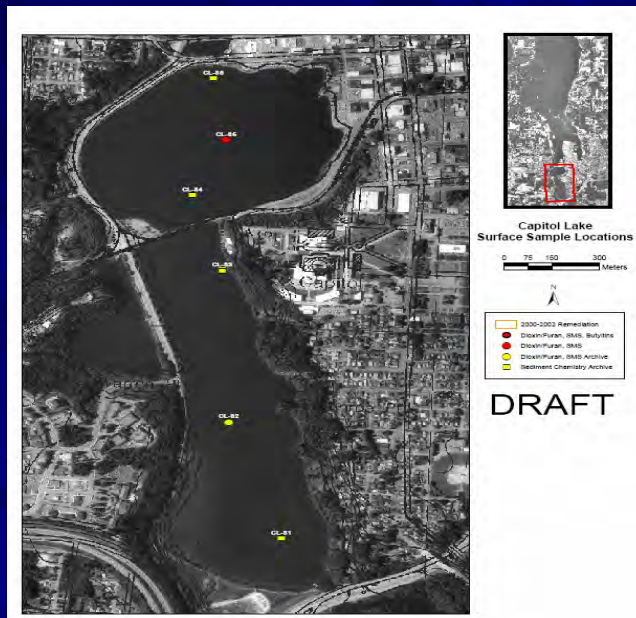
3.23

South Inlet tissue samples



3.24

Capitol Lake surface samples



3.25

PSI – Budd Inlet

■ Rebecca Lawson – Site Manager

3.26

Source Control

- Puget Sound Initiative
- Cooperative approach with the Water Quality Program
- 2006 303(d) Policy
- Urban Waters Initiative

3.27

Puget Sound Initiative

- Aquatic - upland pair focus
- Lower Duwamish – 3 new Source Control staff at NWRO

3.28

Cooperative Approach

- SMS requirements
- Working with WQP on NDPES permitted dischargers
- MOU
- Permit Writer's Manual

3.29

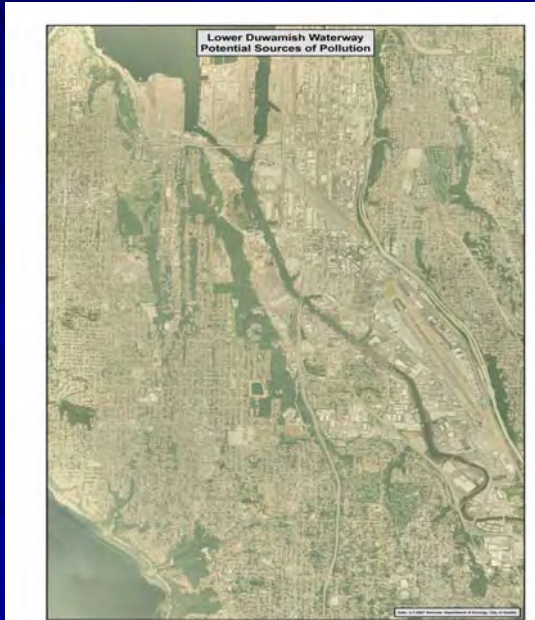
303(d) Policy

- Water Quality Program Policy 1-11: Assessment of Water Quality for the Clean Water Act Section 303(d) and 305(b) Integrated Report
- Harmonize w/ Sediment Management Standards
- Recontamination/source control tool

3.30

UWI Lower Duwamish

- > 80% impervious surface
- NPDES permitted wastewater/stormwater/CSO's
- 5.5 mile Superfund site
- Upland Cleanup sites
- Regulated hazardous waste generators
- Potential hazardous waste generators
- Potential contaminant sources
- UWI – assess these facilities



3.31

Federal Facilities – Puget Sound Naval Shipyard

- 2007 Monitoring
- Area Weighted Average (AWA) calculated as the geometric mean
- Intended goals were 4.7 mg/kg, OC in 2003, and 3 mg/kg in 2014
 - 2003: PCB AWA was 6.7 mg/kg, OC
 - 2005: PCB AWA was 6.1 mg/kg, OC
- Discussion on statistics currently underway

3.32

Freshwater Standards

- **Collaboration with RSET agencies**
- **Planning for reference area characterization**
- **Cleanup requirements – MTCA five year rule review**

EPA Region 10 Superfund Sediment Cleanup Update



Sediment Management Annual Review Meeting
May 2, 2007

Sheila Eckman, Unit Manager
Office of Environmental Cleanup
EPA Region 10

4.1

EPA Puget Sound Priority

- Puget Sound has been designated a regional and national priority by EPA.
- EPA Region 10 has developed a Puget Sound Toxics Strategy.
- The overall goal for cleanup of contaminated sediments is to clean up an additional 200 acres between 2006 and 2011.
- This work will be coordinated with the Governor's Puget Sound Initiative.

4.2

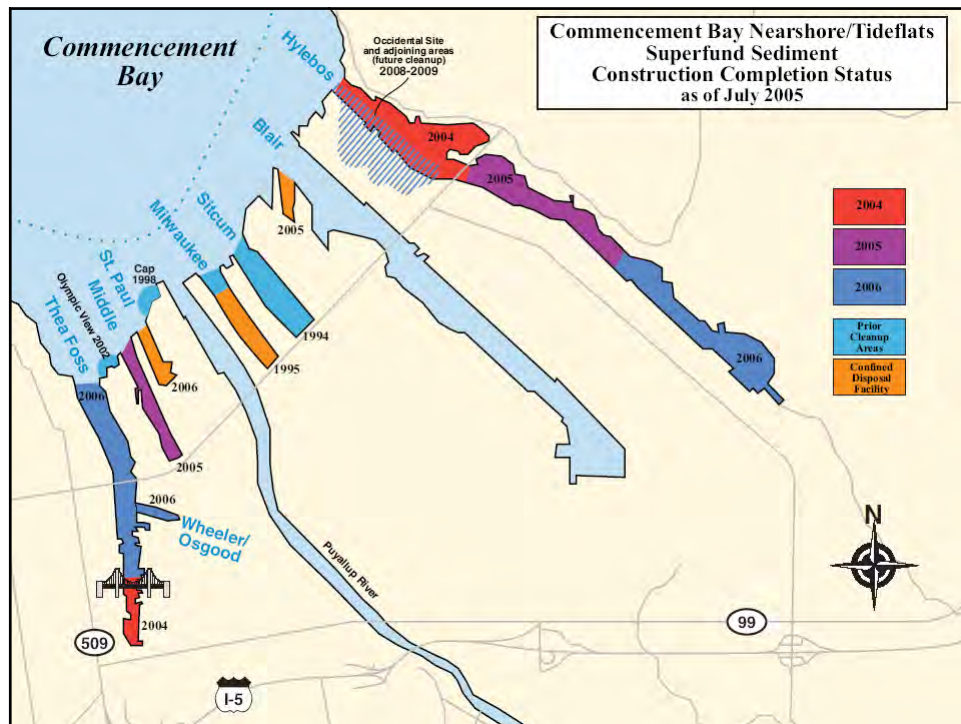
EPA Superfund Cleanup Progress in Puget Sound to Date

- 728 acres of contaminated sediment cleanup.
- 3.8 million cubic yards of contaminated sediment removed.
- 11,315+ pilings removed.
- 28,260 tons of debris removed.
- 223 acres capped.
- 22 acres of enhanced natural recovery.
- 77+ acres of habitat mitigation.

4.3

Update on Sediment Cleanup Projects

4.4



4.5

Commencement Bay 2007-2008

- Complete investigation at Occidental facility.
- Head of Hylebos and Thea Foss moving into long-term O&M and monitoring.
- Continued source control work.
- Continued monitoring, including planning for bay-wide fish tissue monitoring.



4.6



Other Puget Sound Superfund Cleanup Sites

4.7

Harbor Island/Elliot Bay

- East Waterway - Focused RI/FS to complete cleanup.
- Lockheed West Seattle – New to Superfund. Beginning RI/FS.
- Sediment cleanup at Todd and Lockheed shipyards and PSR are complete.

4.8



4.9

Lower Duwamish Waterway Update

- RI data collection complete.
- Draft Human Health and Ecological Risk Assessment Complete.
- Moving into Feasibility Study.
- Source control continues.
- Final RI/FS expected 2009.
- T-117 and Slip 4 Early Action sediment cleanups delayed due to source concerns.

4.10

Oregon Sediment Projects

- Portland Harbor - RI/FS continues, two early action sites ongoing. Contact: Chip Humphrey (503)326-2678
- McCormick & Baxter – Construction complete, including sediment capping – in monitoring phase Contact: Nancy Harney (206)553-6635

4.11

National Update

- National Academy of Science review of sediment dredging at Superfund sites.
<http://www8.nationalacademies.org/cp/projectview.aspx?key=347>

4.12

EPA Contacts

- Sheila Eckman, Unit Manager, 206-553-0455
- Hylebos, Occidental - Jonathan Williams, 206-553-1369
- Thea Foss, T-117 - Piper Peterson Lee, 206-553-4951
- Middle Waterway, McCormick and Baxter - Nancy Harney, 206-553-6635
- Lockheed, Todd, Lockheed West - Lynda Priddy, 206-553-1987
- PSR, Harbor Island, East Waterway – Ravi Sanga, 206-553-2140
- Duwamish RI/FS - Allison Hiltner, 206-553-2140
- Slip 4 - Karen Keeley, 206-553-2141
- Portland Harbor – Chip Humphrey, 503-326-2678



Regional Sediment Evaluation Team (RSET)

Stephanie Stirling
Northwestern Division
USACE

5a.1



5a.2

Interim Final Sediment Evaluation Framework

- Incorporation of public comments
- Issued September 2006
- Continued agency review

5a.3

SEF Philosophy

- ▼ Tiered testing approach to evaluating sediments
- ▼ Comprehensive sampling and testing methods to adequately characterize sediment
- ▼ Site-specific flexibility based on geographic and watershed issues
- ▼ Consistent evaluation procedures to serve multiple agency objectives
- ▼ A mechanism to update the manual

5a.4

Agency Review and Comment

- November/December 2006
- Technical Issues
- Policy Issues

5a.5

Technical Issues

- Freshwater sediment quality guidelines
- Bioaccumulation
- Specific chemicals of concern
 - TBT, PAHs, PCBs, DDT

5a.6

Policy Issues

- Exclusionary guidelines
- No test volumes
- Sampling intensity/DMMUs

5a.7

Interagency Cooperation Plan (ICP)

- Describes how each agency will use the Sediment Evaluation Framework during 2007
- Outlines schedule for completing remaining tasks
- Assigns agency lead for each task

5a.8

"BETA TEST"

- Portland Project Review Group
- Use of SEF on project-by project basis to determine testing requirements
- RSET interagency team
- Consistency and predictability
- Documentation of decisions

5a.9

Project Review Group

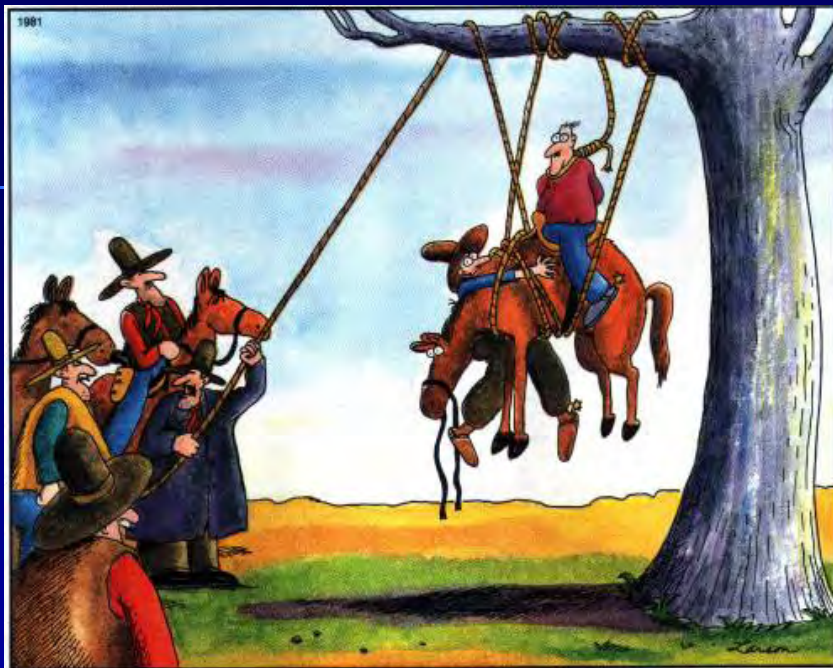
- Refining processes
- Large number of projects
 - 48 separate projects, September 2006 to April 2007
 - SAP review, data review
 - Decision documents
- Use of technology to speed reviews
- 30 day review period

5a.10

Next Steps

- Freshwater Sediment Values team
- Bioaccumulation Subcommittee
- PAH Summit
- Agency review
- Public Workshops
- Updates and revisions to document

5a.11



"OK, OK, OK... Everyone just calm down and we'll try this thing one more time."

5a.12

Freshwater Sediment Quality Guidelines

5b.1

Background

- One of RSET's objectives
- Lack of freshwater values in existing dredging manuals
- Existing state reports:
 - DEQ's Freshwater Sediment SLVs (2001)
 - WDOE's Freshwater SQVs (2003,2003)

5b.2

Concerns with SEF Freshwater Guidelines

- Methodology (floating percentile vs. AET vs. linear regression)
- Lack of chronic endpoints
- Inclusion of new data sets (Portland Harbor, Bunker Hill)
- Protection of ESA species

5b.3



5b.4

Freshwater SQG Group

- State-led effort
- Linked to RSET and SEF
- Management and technical teams
- RSET partners participating
- Schedule through January 2008

5b.5

Technical Team Tasks

- Incorporate new data sets
- Evaluate how to input PAH data
- Agree on data treatment
 - Non-detects, hit no-hit definitions etc.
- Identify questions to be answered by trial SQG runs
- Finalize computation methodology

5b.6

Tasks (continued)

- Agree on reliability parameters
- Conduct trial runs
- Outreach and validation
- Conduct and document final SQG runs

5b.7

Schedule

- Scoping, data acquisition, finalize methodologies
 - March to June 2007
- Data validation, data entry
 - May to July 2007
- Trial runs
 - August 2007

5b.8

- Review of trial runs
 - September to November 2007
- Final runs and validation
 - December to January 2008
- Public review
 - February to March 2008
- Publication
 - April 2008

5b.9



5b.10

Contact Information

Stephanie Stirling

Stephanie.k.stirling@usace.army.mil

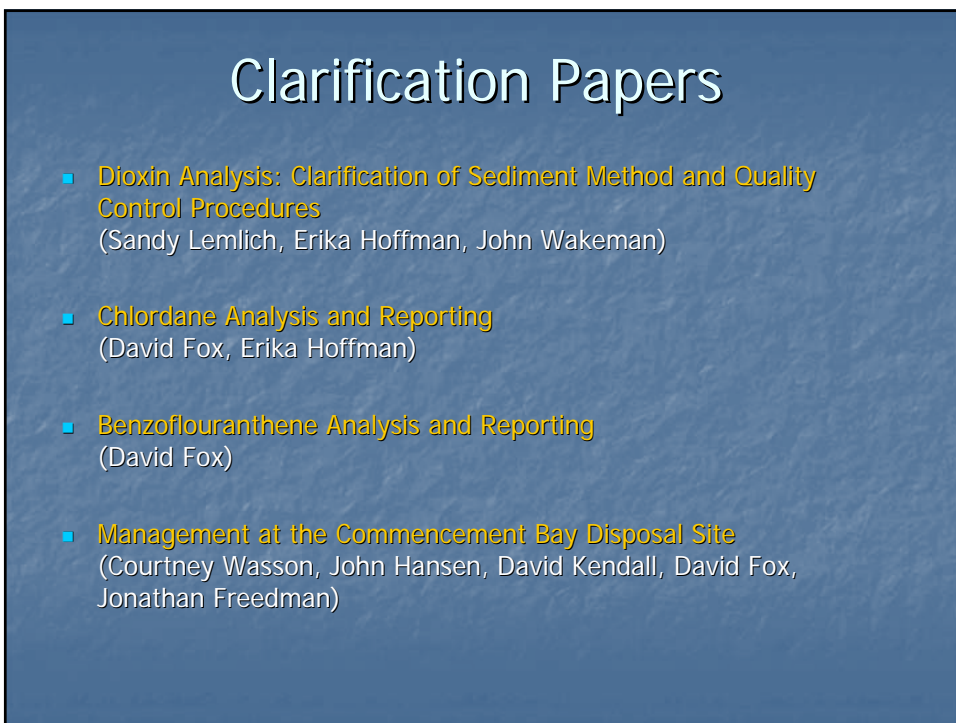
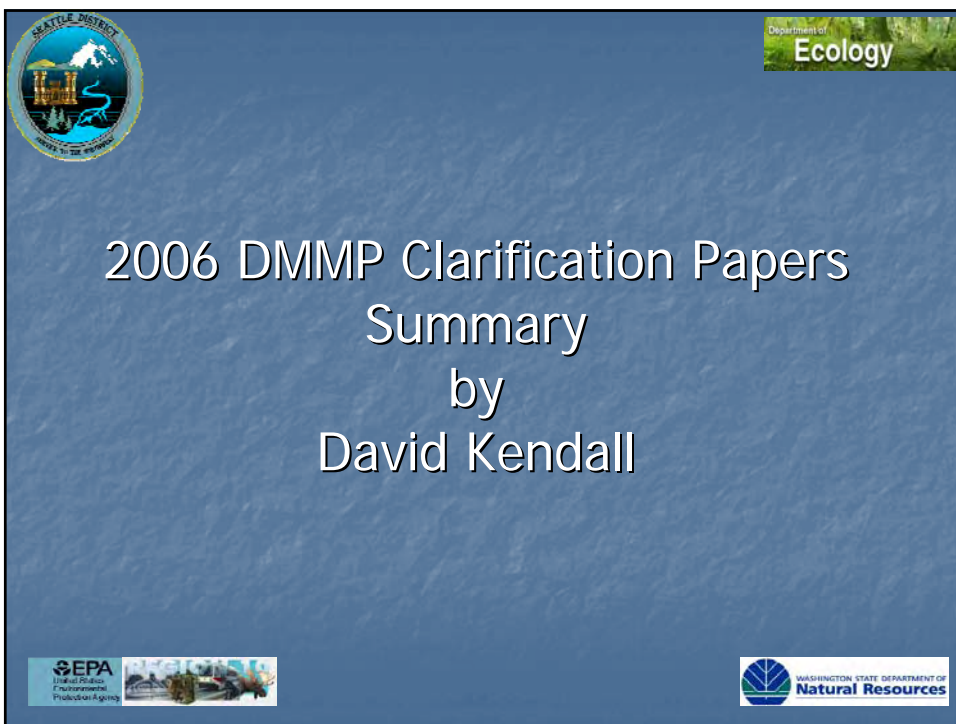
206-764-6945

503-806-6614 (cell)

5b.11



5b.12



Dioxin Analysis: Clarification of Sediment Method and Quality Control Procedures

- Specify data analysis procedures for PCDD/F* to assure defensible data acquisition.
- Supplemental Quality Assurance Project Plan (SQAPP) information will be available on DMMO website for Contractor use.
 - Provides sediment sampling and holding specifications
 - Analytical Methods (EPA Methods 8280, 8290, 1613B) – DMMP agencies strongly recommend use of 1613B over other 2 methods
 - The SQAPP specifies method quality control procedures
 - The DMMP agencies will determine after initial data review, whether further data validation will be required
 - Data Reporting requirements require reporting of all 17 congeners of interest, including 2,3,7,8-chlorine substituted PCDD/F* congeners on a dry-weight basis as well as tabulated as TEO (Toxicity Equivalence Quotient) using the 2005 World Health Organization Toxicity Equivalence Factors (TEFs)

*polychlorinated-dibenzo-dioxins/furans

6.3

Chlordane Analysis and Reporting

- EPA Method 8081A provides 3 options for reporting Chlordane:
 - Technical Chlordane
 - Chlordane (not otherwise specified)
 - Major individual components
- DMMP agencies propose:
 - Replace "alpha-chlordane" with "total chlordane" on the DMMP-COC list for sediments.
 - SL and BT will remain at 10 and 37 ppb respectively
 - Analyze the same list of chlordane components and metabolites in sediment and tissue.
 - Report components and metabolites of chlordane under CAS numbers: cis-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor and oxychlordane.

6.4

Chlordane Analysis and Reporting (cont.)

- Report "total chlordane" as the sum of the detected concentrations of 5 chlordane components and metabolites
- When PCB interference causes one or more of the minor components of chlordane (cis-nonachlor, trans-nonachlor, oxychlordane) to be reported as non-detected at a reporting limit significantly higher than major chlordane constituents (cis- and trans-chlordane) exclude components from the total chlordane summation.
- Continue to quantify heptachlor separately from total chlordane for comparison to sediment SLs.

6.5

Benzofluoranthene Analysis and Reporting

- Benzofluoranthenes on initial PSDDA list restricted definition to the sum of the b- and k- isomers.
- Ecology (1995) SMS promulgated Benzofluoranthenes as sum of b-, k- and j- isomers.
- DMMP proposes to adopt the SMS definition of benzofluoranthenes as the sum of the b-, j-, and k- isomers. The SL and ML for benzofluoranthenes remain unchanged at 3,200 and 9,900 ppb (dry weight) respectively.

6.6

Management at the Commencement Bay Disposal Site

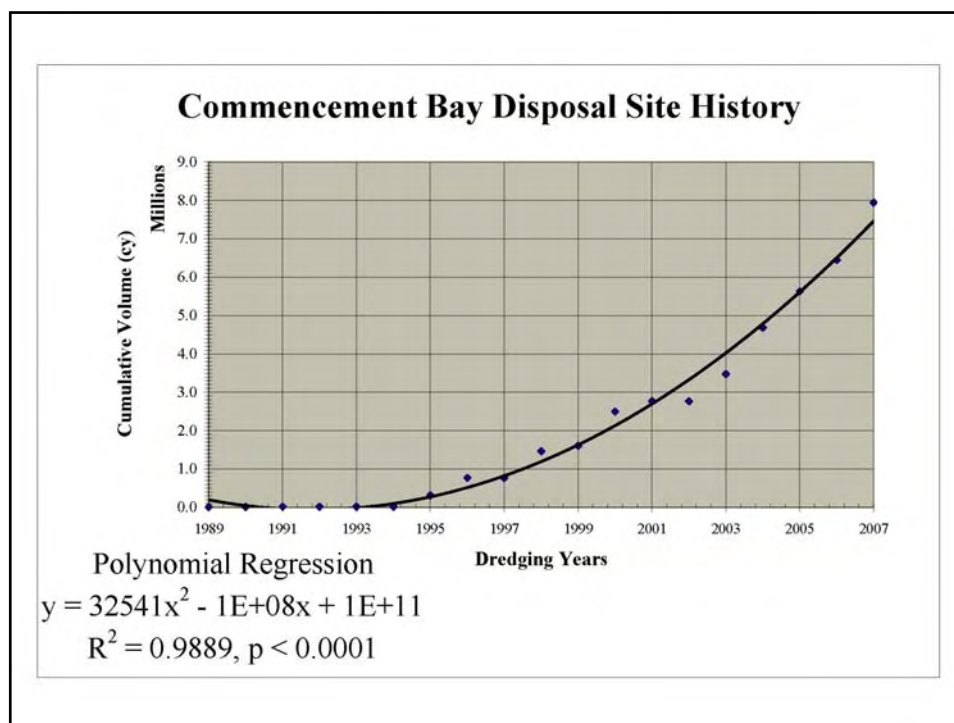
- The Commencement Bay currently has a cumulative disposal volume of 7.9 million cy.
- The site has a 9 million cy capacity limit, which triggers a NEPA/SEPA review. This review is currently underway.
- As an adaptive management action, the DMMP agencies propose moving the target disposal coordinates 565 feet to the SE to dampen the future mound height by 25-30% (STFATE Analysis)
 - **Latitude:** 47.30242 degrees; **Longitude:** 122.4633584 degrees

6.7

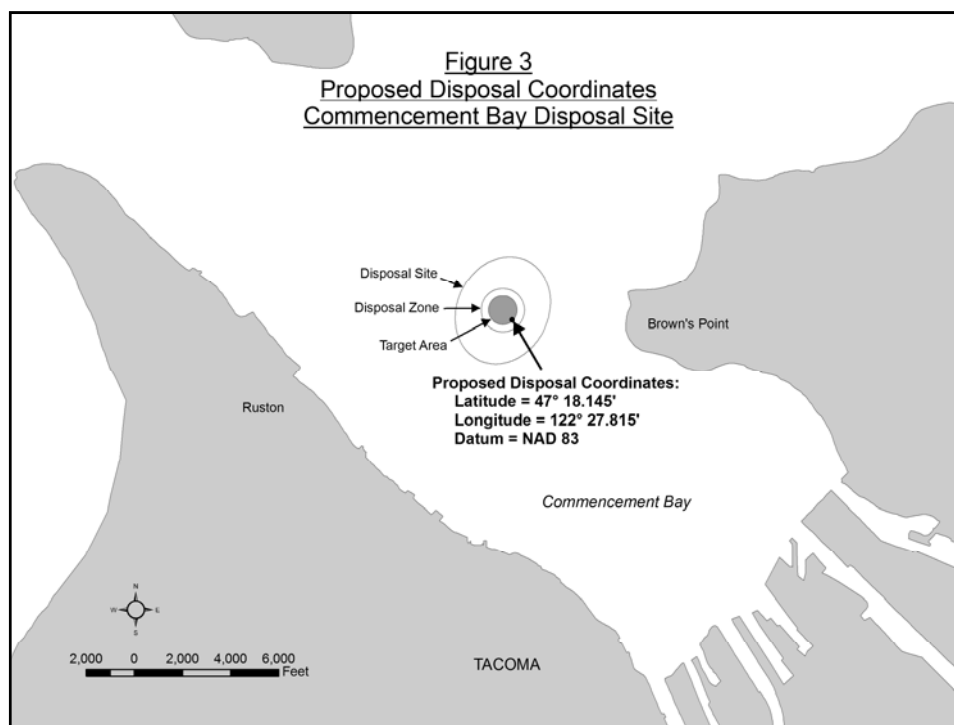
Management at the Commencement Bay Disposal Site (cont.)

- The effective date for the coordinate shift will be 16 June 2007
- The U.S. Coast Guard Vessel Traffic Service will be notified about this change.
- This clarification paper does not change the capacity authorized in the existing shoreline permit (e.g., 9,000,000 cy)

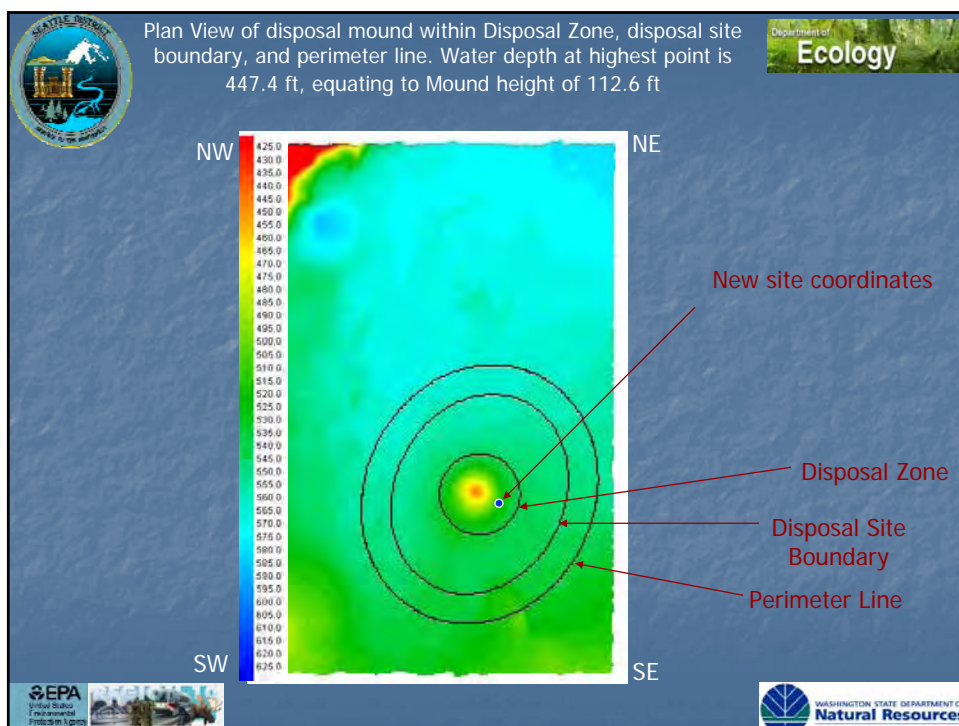
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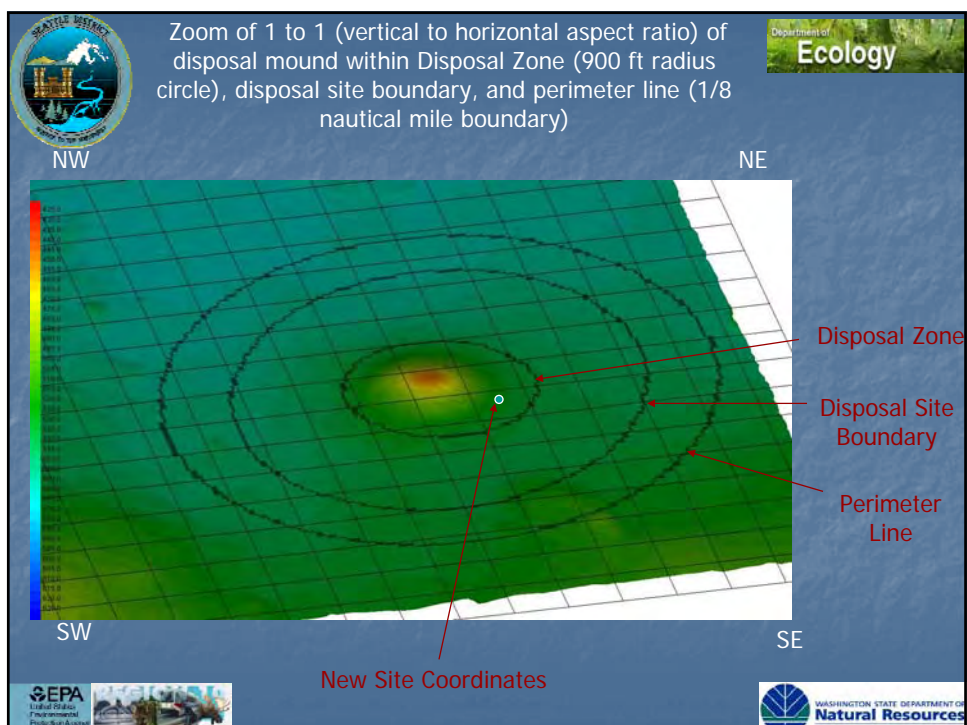
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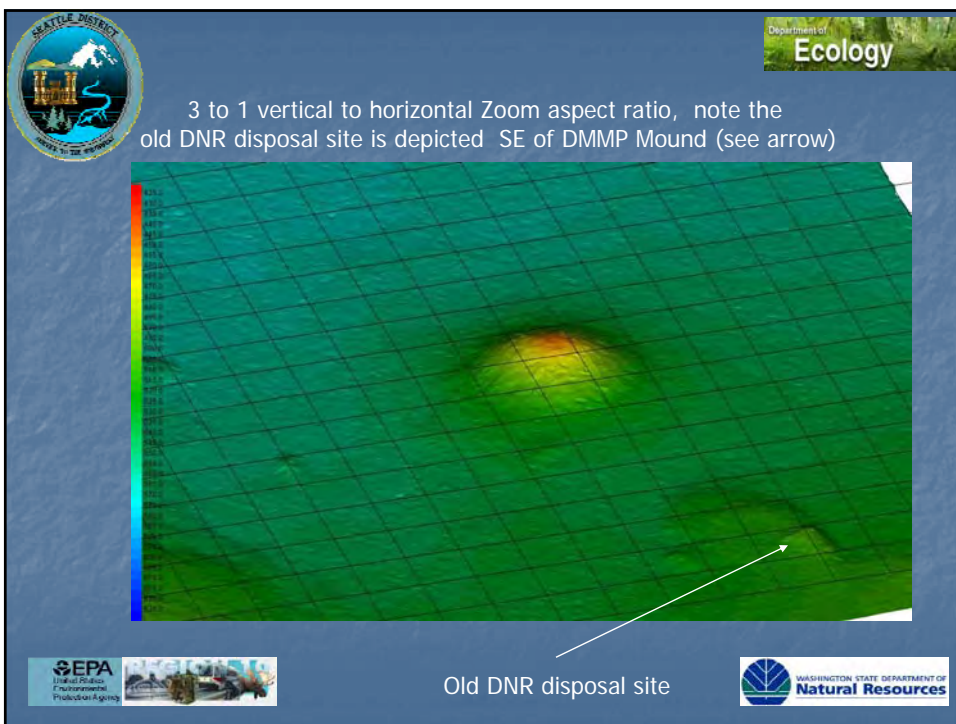
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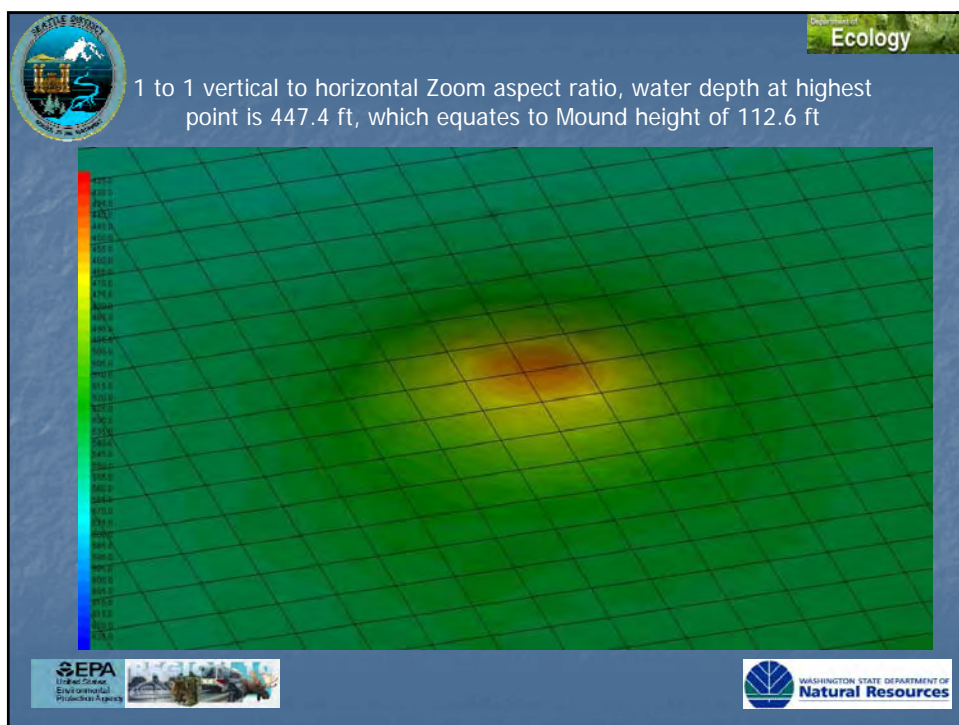
6.11



6.12



6.13



6.14

Status Report on Commencement Bay disposal site evaluation

Jonathan Freedman
EPA Region 10
Sediment Management Program
Freedman.jonathan@epa.gov
(206) 553-0266

7.1

Commencement Bay disposal site Historical Facts

- Designated after PSDDA EIS in 1988
- 1988 analysis selected 9 million cubic yard (mcy) capacity; amount based on arbitrarily chosen capacity dimensions (bottom diameter 4000 ft., top diameter 2000 ft., height 34 ft.)
- Estimated volume forecast for disposal was 3,929,000 cy over the 15-year EIS planning horizon (1985-2001)
- Actual volume disposed at the site from 1989-2007 will be about 7.9 million cy

7.2

The 800-pound (ton?) gorilla in the Bay

- Pierce County Shoreline Permit valid only up to 9 mcy of disposed Dredge material
- Remaining site capacity is 1.1 mcy; ceiling will be reached within 1-2 dredging years
- Current and Future Need for Dredge Material Disposal continues
- Change requires NEPA / SEPA review and new shoreline permit
- DMMP agencies propose updating and revising disposal limits at the site

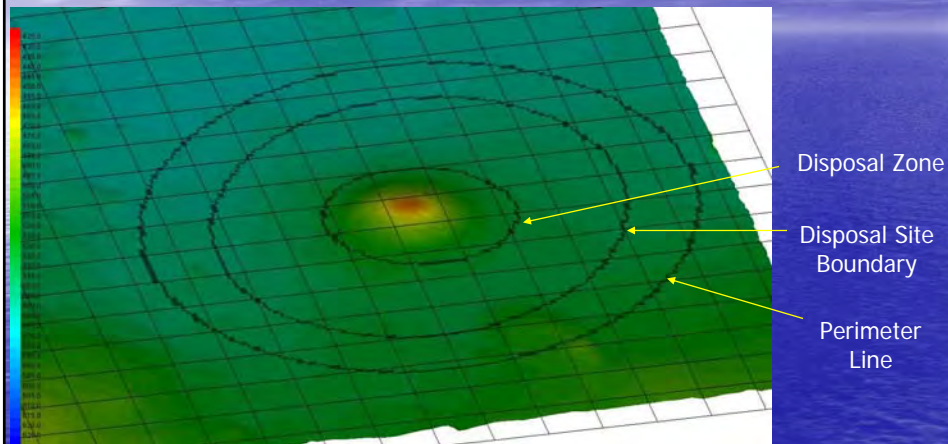
7.3

Long-Term Monitoring

- Monitoring has detected a small amount of dredged material depositing outside site perimeter with small accumulations to N & NW JRH1
- 2004 target zone mound height (about 4.7 mcy disposed) was 80'
- 2006 target zone mound height (6.4 mcy disposed) was 112.6 ft.
- Summer 2007 multibeam bathymetric survey will verify mound height with the present 7.9 mcy

7.4

2006 Mound Height (1 to 1)



7.5

Mound height concerns

The DMMP Agencies ---

- Evaluated the current and likely future rate of disposal at the existing disposal coordinates;
- Used an STFATE analysis to estimate that moving disposal coordinates 565 ft. to southeast could effect a net reduction of 25-30% in future mound height;
- Have exercised adaptive management to dampen the rate of future mound height growth

7.6

DMMP Clarification Paper

- DMMP clarification paper (effective 16 June 2007) officially moves the disposal coordinates 565' to the southeast
- Clarification Paper does not change capacity authorized in current Pierce County Shoreline permit (9 mcy)

7.7

NEPA / SEPA evaluation

- DMMP agencies currently preparing preliminary environmental evaluation to assess long-term options:
 - Determine level of environmental review under SEPA;
 - Consulting with State SEPA agencies and Pierce County;
 - Evaluation will also aid NEPA process;
- DMMP plans concurrent NEPA / SEPA evaluation (2007-08) to assess impacts of increasing site capacity over 9 mcy.
- A DMMP decision to pursue increased site capacity would require a new Shoreline permit from Pierce County

7.8

An Interim Dioxin Approach for the Anderson-Ketron Site

Erika Hoffman (EPA)
John Wakeman (COE)

9.1

DMMP's Dioxin Approach

- Suitability determinations involving dioxin are project-specific.
- In past, utilized "concern level" of 15 ppb TEQ from Grays Harbor risk assessment.
- Updated approach needs to be protective for tribal/subsistence consumption.

9.2

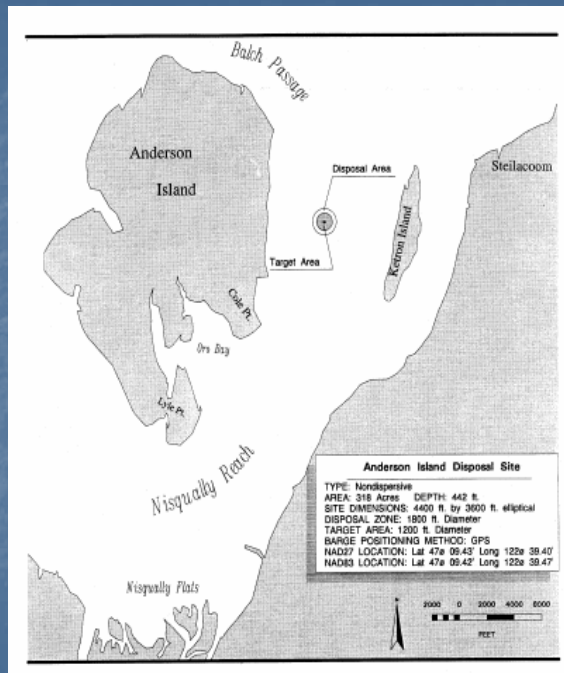
The Case Study

Port of Olympia – Spring 2006

- Detected sediment dioxin (0.1 - 53 pptr)
- Proposed disposal at Anderson-Ketron site
- Suitability determination needed ASAP

9.3

The Disposal Site



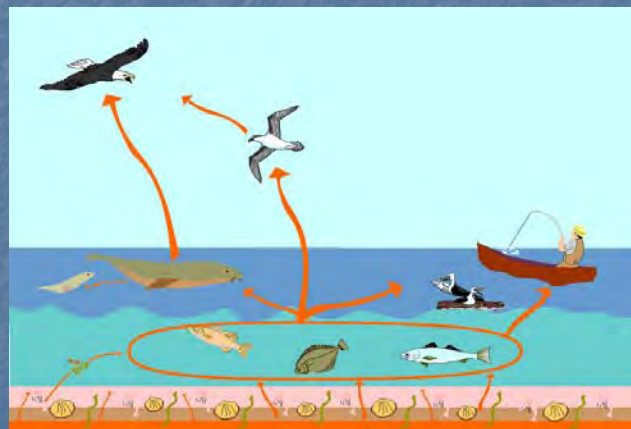
9.4

The Goals

- Use risk-based approach to determine:
 - sediment bioaccumulation trigger value (BT) for dioxin.
 - the maximum acceptable dioxin in benthic invert. tissue (TTL).

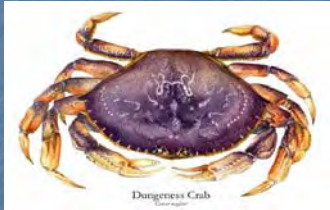
9.5

Conceptual Food Web for Dioxin



9.6

Tribal consumption



9.7

Fish food



Bent nose clam



Polychaete worm

9.8

Screening risk assessment

- "Screening-level" because:
 - Deterministic
 - Conservative

9.9

Screening risk assessment – part 1

Determine maximum acceptable dioxin in crab and sole using conservative assumptions

- Tulalip consumption for crab (83.2 g/day) & sole (9.5 g/day)
- 95th percentile of crab/fish consumption
- 100% of consumption from A/K site and surroundings
- Whole body consumed

9.10

Screening risk assessment – part 1

Risk-based concentrations (1E-05)

- 0.06 pptr (100% sole diet)
- 0.57 pptr (100% crab diet)

A/K site data

- 0.05 – 0.5 (bivalves)

9.11

Screening risk assessment – part 2

Estimate dioxin in crabs/fish from area

- TrophicTrace (sole)
- BSAF (crab)
- Lifetime exposure to non-urban background
- A/K mean dioxin (3.8 pptr)

9.12

Screening risk assessment – part 2

pptr TEQ	Clam	Worm	Crab	Sole
Estimated	0.68	2.2	5.7-11.4	4.37
A/K	0.17	na	na	na
Port G.	na	0.25	0.1-3.0	0.44
Other locns.			0.7- 7* 0.15- 0.20 [#]	0.13 ^{**}

9.13

The outcome

Risk-based BT not practicable based on this screening-level assessment

- Below limits of detection
- Likely below non-urban background
- Uncertainty in human and eco exposure parameters

9.14

Risk Management

Interim approach for dioxin at A/K site

- Background-based (using A/K site data n=8)
- Maintains current dioxin levels in sediments
- 2 Tiered comparison
 1. A/K site max = 7.3 pptr
 2. A/K site mean = 3.8 pptr
- Port of Olympia suitability determination - Fall 2006
- Appendix A-2 on DMMO web site

9.15

What next?

- 2007 site monitoring of dioxin in benthos, sole and crabs
- Stakeholder dioxin workshops
- Revisiting risk-based approaches

9.16

Status Report on Dioxin Stakeholders Workshops

Dr. Laura Inouye
Washington State Department of Ecology

10.1

Project and Status

- We are revisiting our procedures relative to dioxin in dredged material
- We have just sent out a fact sheet and questionnaire asking for stakeholder input
- We'll give a project overview today and discuss next steps

10.2

Purpose of Workshops

- Importance/need for dredging
- DMMP role
- Disposal sites
- DMMP needs guidance for dioxins in dredged materials.
- Consistency with the goals of PSI



10.3

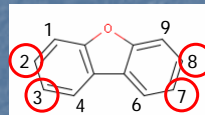
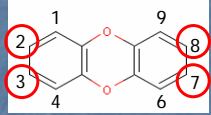
Navigation Dredging

- Conducted frequently in port, harbor and marina areas for maintenance and new work
- Approx. 20 Million C.Y. between 2000 and 2006
- Critical to State economy
- Important to facilitate continued dredging and maintain availability of open-water disposal sites while protecting health of Puget Sound

10.4

Dioxin Overview

■ Dioxins and furans



- Produced by Natural and Industrial activities
- Occur throughout the NW at low levels
- Toxicity and bioaccumulation
- TEQ's
- Analysis issues

10.5

DMMP and Dioxins (1991-2006)

- Dioxin testing on a "reason to believe" basis only – not many sites
- Site-specific decisions
- Risk-based (recreational fisherman) 5/15 ng/kg TEQ developed for Grays Harbor in 1991.

10.6

DMMP and Dioxins (2006)

- Risk assessment based on trophic modeling and tribal consumption rates (Anderson/Ketron site).
- Risk-based values were well below limits of detection and area background are therefore impracticable for interim use.

10.7

DMMP and Dioxins (2006)

- Interim approach developed based on maintaining current "background" dioxin levels in vicinity of disposal site.
- Interim dioxin values for A/K site are a mean of 3.8 pptr TEQ and a max of 7.3 pptr TEQ.
- These values are site-specific but the approach can be applied to develop interim dioxin values for other open-water non-dispersive sites.

10.8

DMMP and Dioxins (2006)

- For dispersive sites, interim dioxin values will rely on comparison to nearby reference site.
- Site and Project specific
- No change for Grays Harbor

10.9

Initial Stakeholder Reactions to Interim Approach

- Concern that the feasibility of navigation dredging could be significantly impacted.
- Concern that an appropriately conservative approach be used.

10.10

Dioxin Stakeholder Workshops

- DMMP is organizing workshops to get broad stakeholder input, to identify and explore OPTIONS for dioxin.
- Expected output of workshops will be RECOMMENDATIONS to management incorporating public feedback.
- Agency management (Ecology/Corps/EPA/DNR) will participate in facilitated deliberation and decision making for proposed PROGRAMMATIC REVISIONS.

10.11

Dioxin Stakeholder Workshops

- DMMP is organizing workshops to identify and explore OPTIONS for dioxin.
 - Generate questionnaire for distribution: Overview, request for input, and level of participation for workshops.
 - Convene open technical workshops for stakeholder input on background and risk-based approaches.
 - Hold government-to-government meetings with affected Tribes.

10.12

Identified Stakeholders

- Ports, Navy, Coast Guard, Marinas and others with dredging needs.
- Tribes (fishers and subsistence consumers)
- Local government agencies
- Public and environmental groups
- Commercial and recreational fishers
- State/Federal agencies (including RSET)

10.13

Initial Issues and Options

- Background vs risk approaches
- Improvements on risk-based approach
- Site-specific vs area background
- Reference, rural, or urban background
- Approaches for dispersive vs non-dispersive disposal sites
- Acknowledgement of acceptable adverse effects at non-dispersive sites
- Other ideas and approaches from workshops

10.14

Workshop Outcomes

- Workshop input will be summarized (analysis of the issues).
- DMMP staff will use the data to provide recommendations to management.
- Facilitated deliberation and decision making will result in a decision for proposed evaluation framework on dioxin in dredged sediments.
- Proposed evaluation framework will undergo SMARM or SMARM-like process for approval at or before SMARM 2008.

DMMO website will post workshop summaries and other information.

10.15

Weblinks and Next Steps

- Questionnaire logistics and timing
- DMMO website
<http://www.nws.usace.army.mil>
 - Click on "Dredged Material Management" at left
 - Questionnaire and interim measures posted here.
- Likely timing for workshops

10.16

Weblinks and Next Steps

- Questionnaire logistics and timing
- DMMO website
 - <http://www.nws.usace.army.mil>
 - Click on "Dredged Material Management" at left
- Likely timing for workshops

Can Sediment Profile Imaging surveys streamline cleanup investigations?

Thomas Gries

Dale Norton, Peter Adolphson and Brad Helland



Joe Germano and David Browning



11.1

Acknowledgments

Ecology - Dale Norton, Sandy Aasen, Paul Anderson, Chance Asher, Nigel Blakley, Chris Burke, Randy Coots, Casey Deligeannis, Dan Dugger, Maggie Dutch, Bill Ehinger, Brandee Era-Miller, Arianne Fernandez, Marcia Geidel, Brad Helland, Joan Letourneau, Laura Lowe, Carol Norsen, Valerie Partridge, Patti Sandvik and Kathy Welch

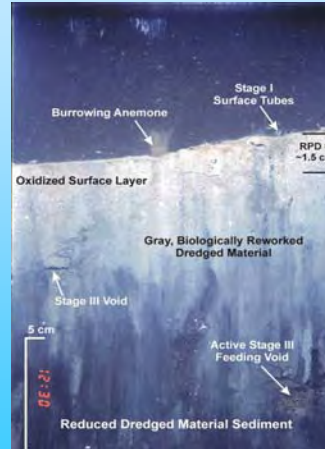
Consultants - Biomarine Enterprises, Germano & Associates, Musgrove Environmental Solutions, Steve Ferraro (US EPA), TerraStat Consulting Group

Analytical services - Manchester Environmental Lab and Analytical Resources Inc. (chemistry), Weston Solutions (toxicity), FHTS and OIKOS (benthic assessments)

11.2

What is SPI?

- Method to photograph Sediment Water Interface



- To understand
 - Sediment stability and structure
 - Benthic habitat, biological activities

6/29/2007

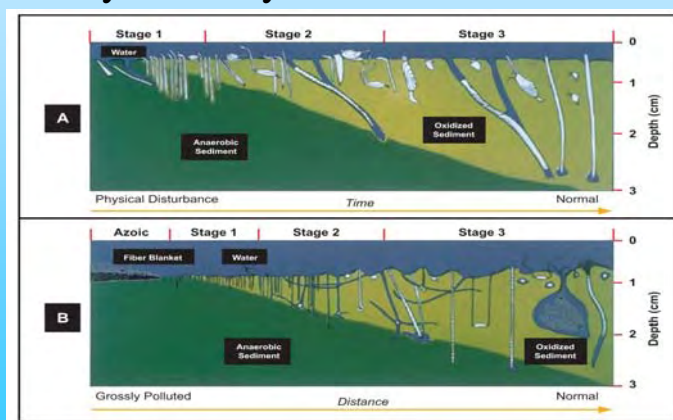
SMARM 2007 - Can SPI surveys streamline sediment cleanup?

3

11.3

Uses of SPI

- Identify disturbance and stage of benthic community recovery



6/29/2007

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4

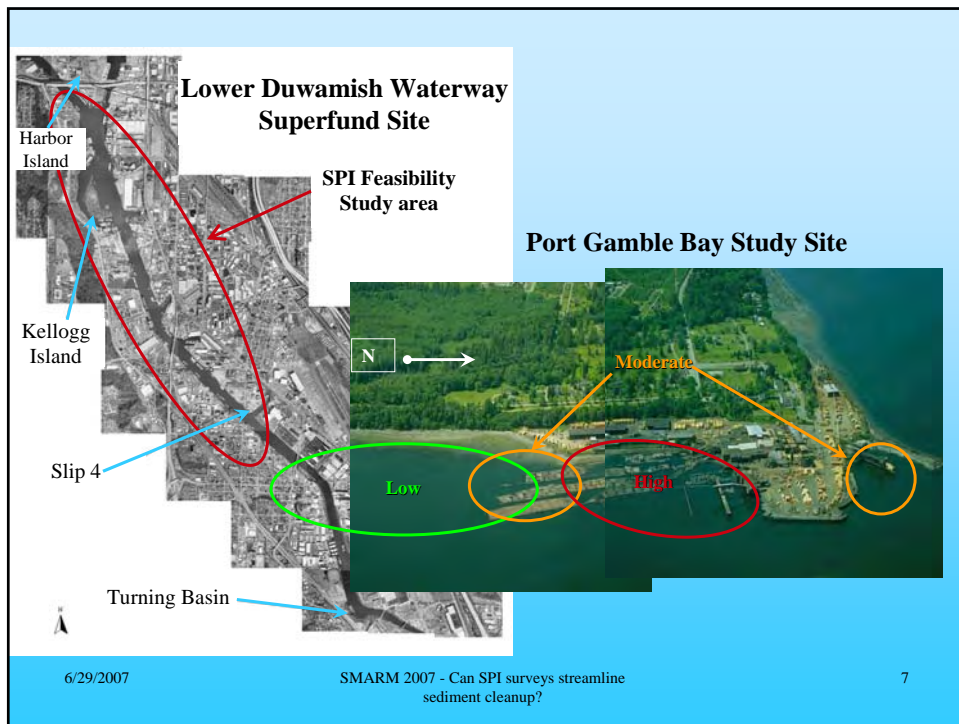
11.4

Project Goals

- Determine if SPI can predict sediment quality
- Supplement existing data at two different sites
- Identify benthic communities that are most likely to be impaired
- Characterize 'baseline' conditions

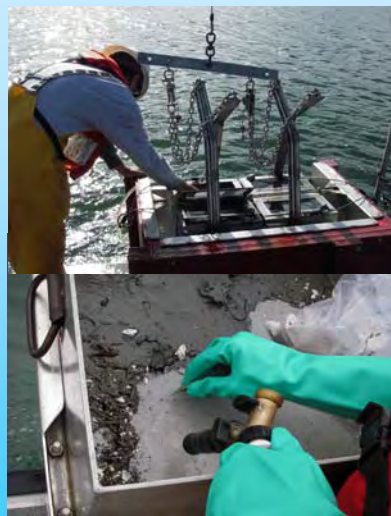
Approach and Study Design

- Exploratory studies of two sites
- Separate SPI and sediment quality surveys
- Non-random sampling of three strata
 - *High, Moderate* and *Low* expected likelihood of benthic community impairment



11.7

Sequenced SPI, Sediment Quality Surveys



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11.8



Lower Duwamish station LDW-096 (August 2006)



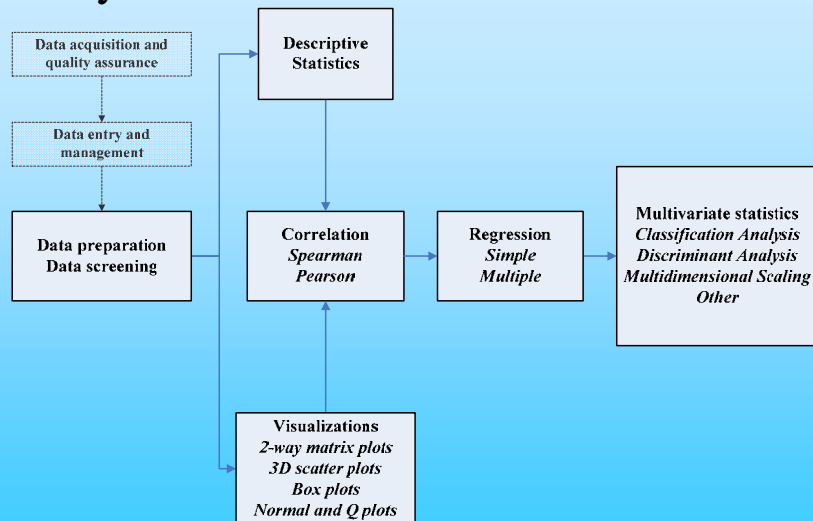
Port Gamble Bay station PGSP-103 (August 2006)

SPI Data

<i>Penetration Depth & Area</i>	<i>Boundary Roughness</i>	<i>RPD Depth & Area</i>	Grain Size Major Mode	Presence of Methane Bubbles	Feeding Voids
Infaunal Successional Stage	No. of Mudclasts	Bedforms	Dynamics	<i>% Wood Waste</i>	No. of Small & Large Tubes
<i>No. of Burrows</i>	Oxic Voids Depth	Pits & Mounds	Infauna Presence	Organism Sediment Index (OSI)	Benthic Habitat Quality Index (BHQI)

Analysis

“90% perspiration and 10% analysis”



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11.11

Results - Contrasting Study Sites

Site/Statistic→	Port Gamble			Lower Duwamish Waterway		
Parameter	Min	Median	Max	Min	Median	Max
RPD depth (cm)	1.5	3	4.5	0.75	2.9	5.4
Wood debris (% volume)	0	4.3	56.7	--	--	--
Number of burrows	0	4.7	14.3	3.3	9.7	16.3
Org. Sediment Index	6.5	9	10.7	5.33	8.8	11
Fines (%)	7	20.3	51.6	41.5	75.6	88.7
TVS (%)	1.9	8.5	33	--	--	--
TOC (%)	0.7	2.7	23.7	1.6	2.4	3.2
Sulfide (mg/Kg)	2.2	133	951	156	734	1610
Sum Metals (mg/Kg)	--	--	--	220	380	755
Sum PAHs (ug/Kg)	--	--	--	1150	3740	17340
Sum PCBs (ug/Kg)	--	--	--	97	207	3200
Richness (no. taxa)	47	85	130	15	44.5	83
Swartz Dominance	2	13	20	3	6	8
Diversity (H)	0.7	1.36	1.57	0.69	1.03	1.2

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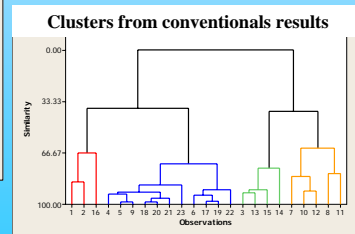
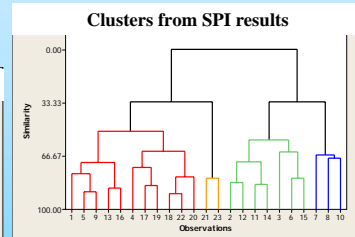
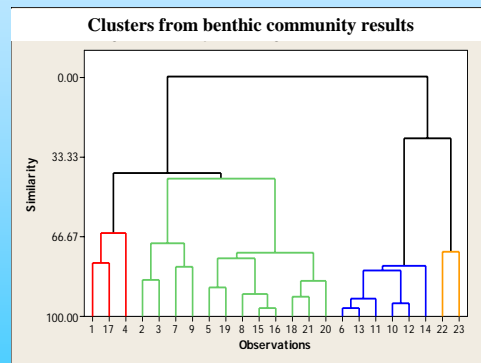
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12

11.12

Results - Cluster Analysis

- Do benthic groups mirror SPI or conventional groups?
- Port Gamble Bay example:



6/29/2007

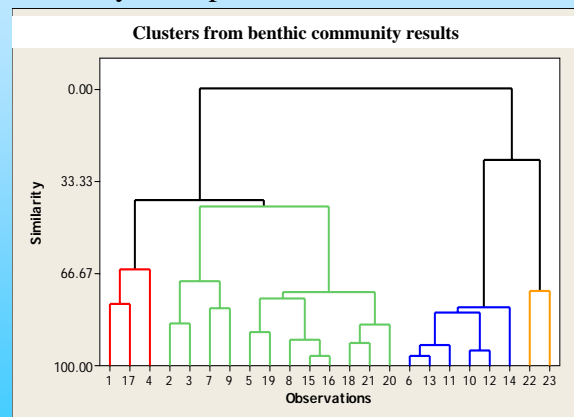
SMARM 2007 - Can SPI surveys streamline
sediment cleanup?

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11.13

Results - Cluster Analysis

- Do benthic groups mirror SPI or conventional groups?
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SMARM 2007 - Can SPI surveys streamline
sediment cleanup?

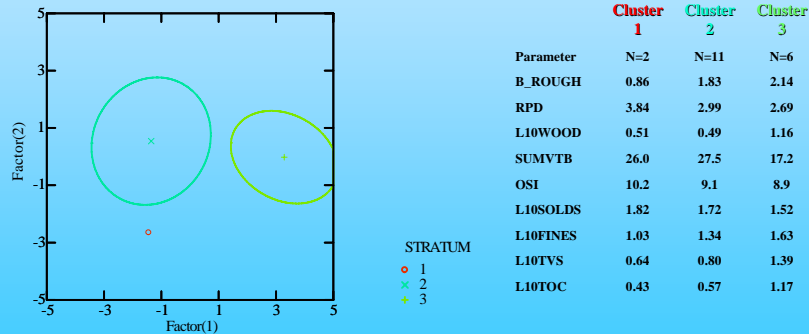
14

11.14

Discriminant Analysis

Determines whether a set of variables is useful in discriminating between previously-identified groups

Canonical Means Plot



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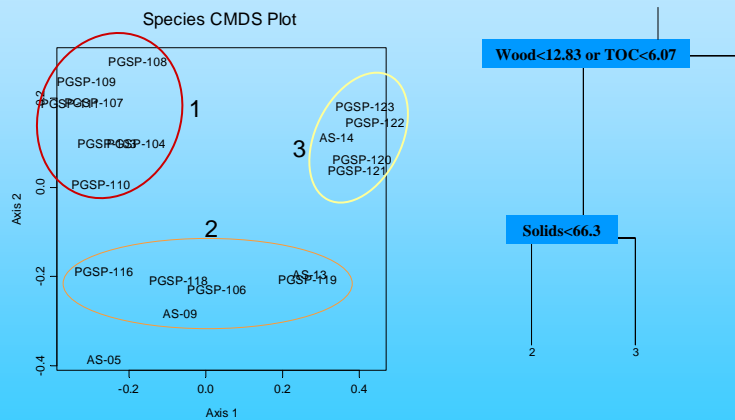
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15

11.15

Results - (N)MDS

Models representing information about a data set by points in space (e.g., distance \propto correlation)



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11.16

Conclusions

- Surveys provided quality data to identify SPI - sediment quality relationships, fill data gaps, potential impairment, and possible 'baseline' conditions
- Most locations had Stage III infauna, OSI > 6, and sediment quality < SQS*
- No 'silver bullet' - few strong correlations between SPI or conventional parameters and sediment quality indicators (some exceptions)
- Multiple variables needed to describe and explain benthic communities
 - Classification, ordination analyses ID benthic communities
 - Discriminant analysis and classification trees identify factors contributing to grouping of benthic communities

Recommendations

- More frequent SPI surveys in cleanup investigations
 - Use sediment structure, stability data → 'fate and transport'
 - Use sediment and benthic community characteristics → 'nature and extent'
 - Use results to identify areas and types of severe disturbance
 - Use to predict some conventional sediment parameters
 - Use SPI indicators of benthic community structure/function (successional stage and relative degree of bioturbation) as independent LOE in benthic risk assessments, *but*
- SPI results do not define unacceptable adverse benthic community effects/impairment

Recommendations

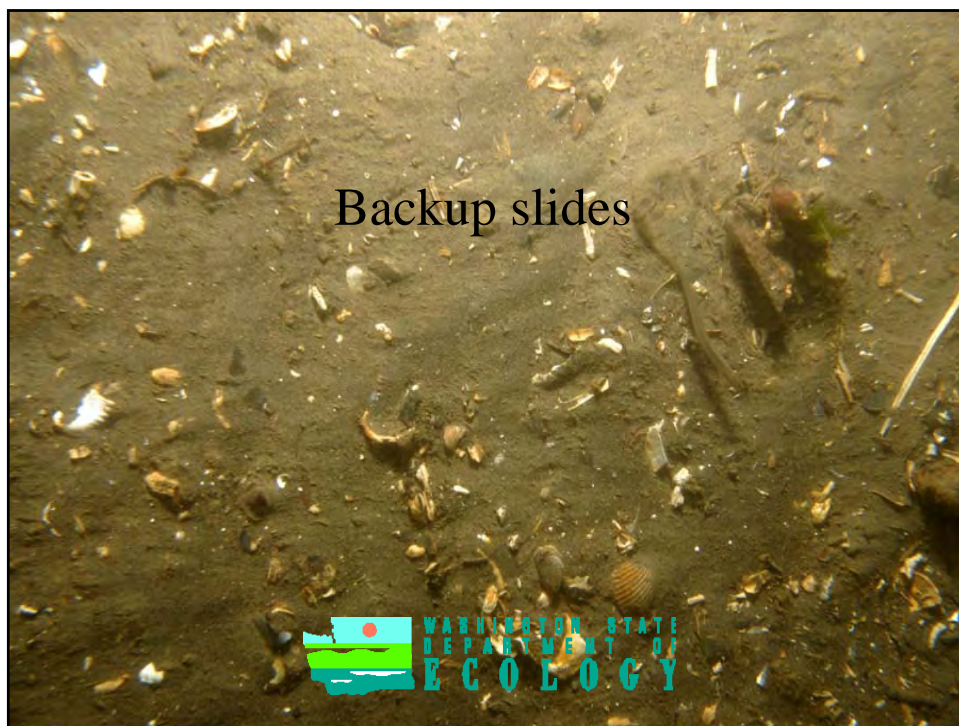
- More data analysis and peer review
- Study new wood waste and/or more highly contaminated sites using more robust design
- ➔ SPI surveys
 - Should be used more frequently to investigate cleanup sites
 - Can reduce the footprint for intensive sediment sampling
 - Should not be over-interpreted: do apparently-oxic sediments that are deeply bioturbated by Stage III communities equal a 'healthy' benthic community?
- Amend SMS biological criteria

Acknowledgments

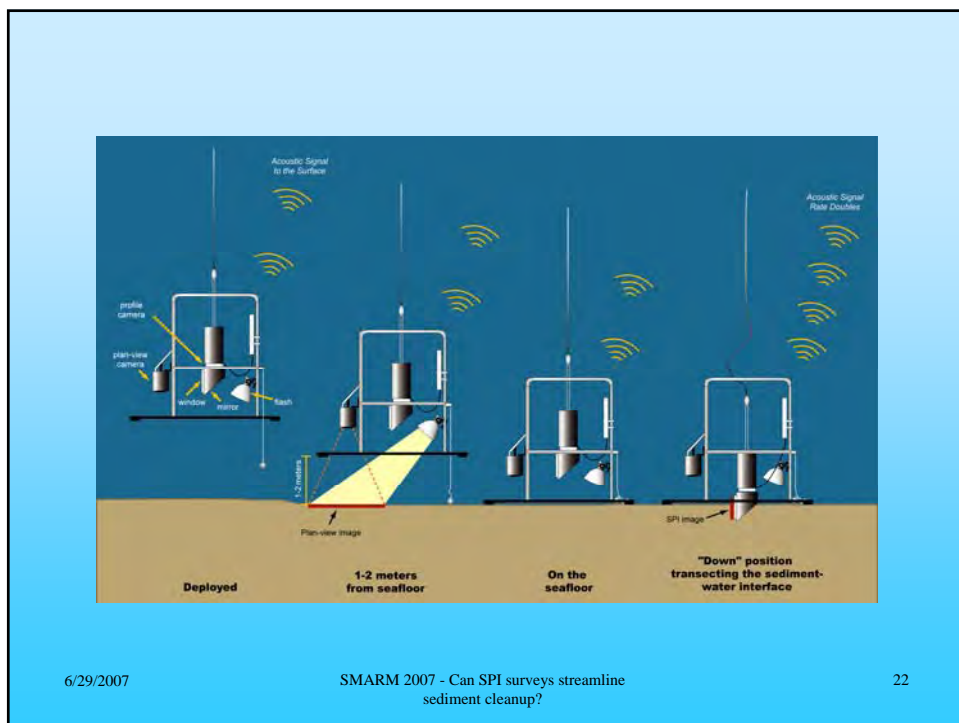
Ecology - *Dale Norton, Sandy Aasen, Pete Adolphson, Paul Anderson, Chance Asher, Nigel Blakley, Chris Burke, Randy Coots, Casey Deligeannis, Dan Dugger, Maggie Dutch, Bill Ehinger, Brandee Era-Miller, Arianne Fernandez, Marcia Geidel, Brad Helland, Joan Letourneau, Laura Lowe, Carol Norsen, Valerie Partridge, Patti Sandvik and Kathy Welch*

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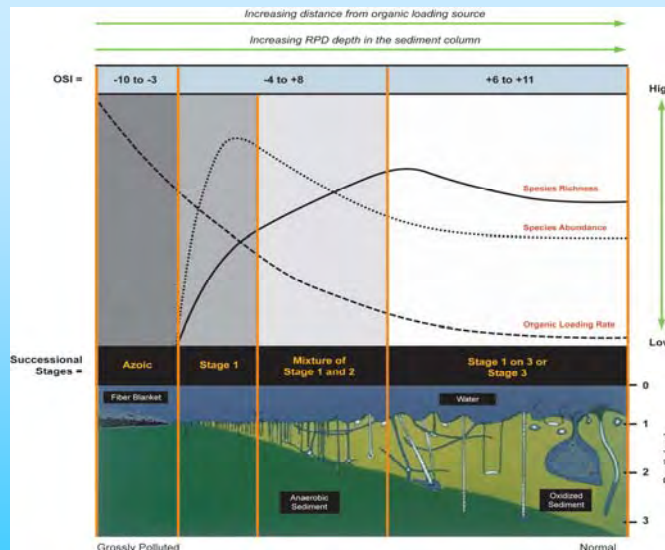
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11.21



11.22



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11.23

Methods

Standard sampling, chemical and biological methods

<http://www.ecy.wa.gov/pubs/0603116.pdf>

<http://www.ecy.wa.gov/pubs/0603117.pdf>

- DGPS positioning
- SPI methods in venter QA Project Plan: <http://www.ecy.wa.gov/pubs/0603119.pdf>
- Van Veen grab sampler for collecting surface sediment samples for analysis of conventionals, chemistry, toxicity and benthic communities
- Mostly 'PSEP Protocols and Guidelines' (EPA 1986-2001)

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11.24

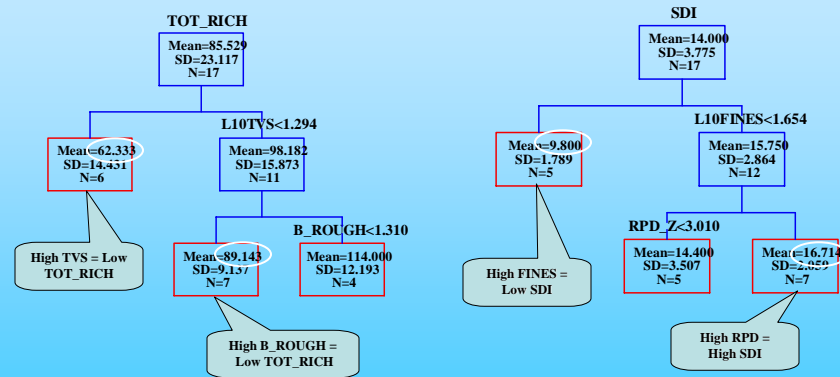
Analysis - Correlation

- Spearman rank correlations
- For Port Gamble Bay, most significant correlations involve boundary roughness, % wood, number of burrows, % fines, TVS, TOC and:
 - Total taxa and annelid richness
 - Miscellaneous taxa abundance (with & without Echinoderms)
 - Swartz Dominance Index

Analysis - Regression

- Simple, least squares
 - Reasonable r^2 values between many same-type variables
 - SPI parameters do not predict sediment conventionals, chemistry, toxicity or benthic results very well, except ...
 - For Port Gable Bay, % wood as independent variable predicts % TVS and % TOC (and vice versa)
 - Might help define RAOs and cleanup site boundaries?
- Multiple (step-wise and best subsets)
 - Can predict benthic metrics of interest, e.g., total abundance and richness, SDI and H' , but ...
 - 3-4 independent SPI and/or conventionals variables needed for regression with adjusted $r^2 = 0.4 - 0.6$.

Results - Classification Trees



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11.27

Study Costs (per sample)

Categories	Port Gamble	Lower Duwamish
SPI Survey	\$510	\$510
Sediment Studies	\$1600	\$4400
Staff (planning, contracting field work, analysis, reporting)	\$1000	\$1400
Conventionals/Contaminants	\$160 / --	\$160 / \$1200
Sediment toxicity (two acute tests)	--	\$925
BCA	\$445	\$710

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11.28



Advanced Tools For Environmental Data Analysis

Department of Ecology



Nagesha Kannadaguli
Toxics Cleanup Program

12.1



Agenda

- Schedule outline
- New functionalities
- MyEIM Portal Overview
- Query Builder
- GIS Interface
- Analysis Tools
 - Chemical Analysis
- Q & As



12.2



Project overview

- Develop in phases
 - > Phase I
 - Chemistry
 - Derived Variables
 - Bioassay
 - Query builder, GIS
 - MyEIM Portal
 - > Future Phases
 - MTCA...
 - Benthic Infauna
 - Histopathology
 - Tissue chemistry
 - Bioaccumulation



12.3




New in Phase I

- Create station groups through GIS
 - Custom query builder to get specific data
- Apply further filters on Groups
- Instantaneous sharing of queries
- Multiple Cleanup Parameters
 - Cross media/matrix analysis
- Create customized cleanup criteria and DVs
- Calculation of derived variables on the fly
- Extended UOM independence



12.4

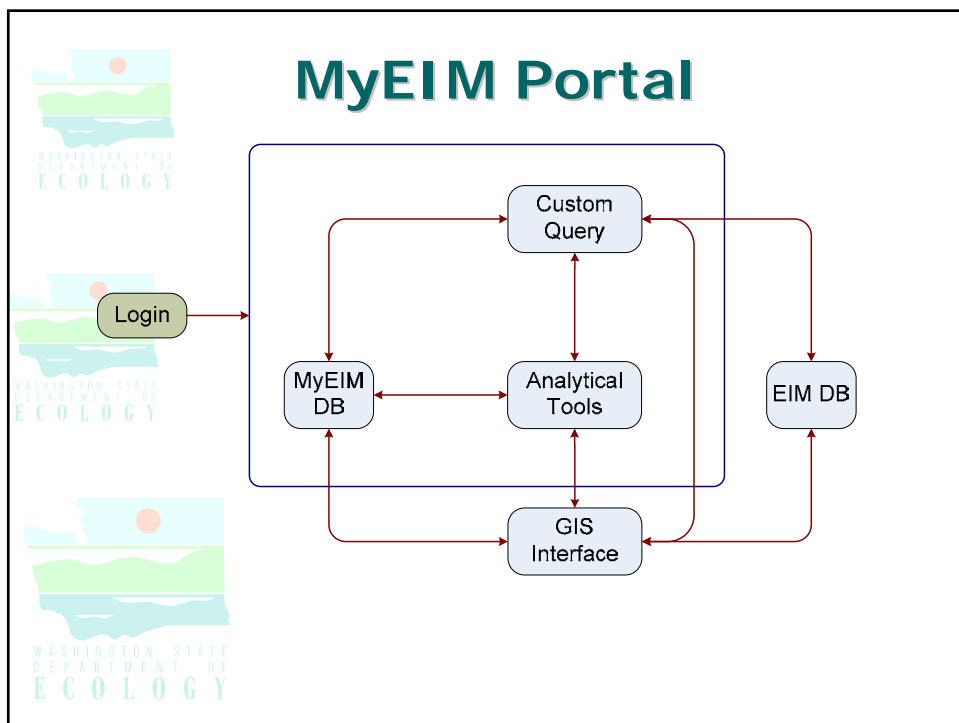


- Detects only, non-detects only, or both (default)
- Stack comparison results in columns or rows.
- Web application: IE6
- Application and data updates instantaneous

New in Future phases

- Sample level and station level aggregation
- Maximum/Minimum, last recorded values.
- Extensive Documentation
- ...

12.5



My EIM :: MyEIM Home :: Default Home Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeintest/MyEimPortal/Default.aspx?psk=171cvg1ue4nhgvzbzyv12dh55

Department of Ecology

My EIM

Environmental Information Management System

My EIM Home Custom Search Analysis Work Item Report

EIM > My EIM > Default Home Page

Welcome: Nagesha Kannadaguli

My Custom Searches

Name	Description	Created Date	Last Modified
PSDDA_95	PSDDA_95	3/6/2007	3/6/2007
LODRIV98ByDepth	LODRIV98 Depth selected	3/14/2007	3/14/2007
LODRIV98	LODRIV98	3/14/2007	3/14/2007
all TSP As NK	all TSP Arsenic data	3/19/2007	3/19/2007
BellingHam	BellingHam Studies	3/29/2007	3/29/2007

Search Term: [Edit](#) [Run](#) [Delete](#) [Save As](#) [Share](#)

Search Term

Name	Description	Created Date	Last Modified
Marine_Sediment_Samples	Marine Sediment Samples.	3/7/2007	3/7/2007
Freshwater_Sediment_Samples	Freshwater Sediment Samples.	5/1/2007	5/1/2007

Shared Searches

No searches saved.

EIM NEWS

New Analysis Tools
Analyze data, compare with cleanup values
[edit](#) 3/21/2007

New Custom Search
Create your own search and filter data
[edit](#) 3/21/2007

Release Notes
Feature Summary This:
[edit](#) 5/1/2007
[add article](#)

MY EIM HELP

Custom Search
Getting started

Analyzing Data
Tips and tricks

Custom Groups
Accessing your groups

http://myeintest/MyEimQuery/Default.aspx?type=chemistry&psk=171cvg1ue4nhgvzbzyv12dh55&mode=execute&datagroupid=75

12.7

MyEim Portal :: Portal Application :: Portal Application Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeintest/MyEimQuery/Default.aspx?type=chemistry&psk=171r3tm1dnh2x5hvd3c3qgxa45&mode=edit&datagroupid=75

[Help for Sedqual Users](#)

Step 1. Select columns to display

Category	Field Name
Study	User Study ID
Location	Study Name
Sample	Study Purpose
Result	Study Implementation Status
	Study Type
	Study QA Planning Level
	Study QA Assessment Level
	Study Start Date
	Study End Date
	Responsible Entity
	Study Ecology Contact
	Study Grant/Loan Number
	Study Area Name
	Study Area Description
	Study Area Type
	Study Result Description
	Study QA Project Plan Description

Picked display columns

User Study ID
Study Name
Study Location Name
Field Activity Start Date
Sample ID
Sample Matrix
Sample Source
Result Parameter Name
Result Date
Result Reported Value
Result Value UOM
Result Measurement Basis Code
Result Data Qualifier
Result Method
Result Lab Name
Latitude Decimal Measure
Longitude Decimal Measure

☐ Include only 'Synoptic Samples' in the query results.

Step 2. Apply search criteria

Category	Field Name	Operator	Value	Edit	Delete
{0} Study	User Study ID	Equal	LODRIV98	Edit	Delete

[Add Criteria](#)

{0}

[Check](#)

User Study ID = 'LODRIV98'

[Show Data](#)

Done

12.8

MyEIM Portal :: Portal Application Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimQuery/Default.aspx?type=chemistry&psk=17r3tm1dnj2x5hvdcb3qdgxa45&mode=edit&datagroupid=55

Location
Sample
Result

Study Name
Study Purpose
Study Implementation Status
Study Type
Study QA Planning Level
Study QA Assessment Level
Study Start Date
Study End Date
Responsible Entity
Study Ecology Contact
Study Grant/Loan Number
Study Area Name
Study Area Description
Study Area Type
Study Result Description
Study QA Project Plan Description

Add >
< Remove
Move up >
Move down >

Study Name
Study Location Name
Field Activity Start Date
Sample ID
Sample Matrix
Sample Source
Result Parameter Name
Result Date
Result Reported Value
Result Value UOM
Result Measurement Basis Code
Result Data Qualifier
Result Method
Result Lab Name
Latitude Decimal Measure
Longitude Decimal Measure

☐ Include only 'Synoptic Samples' in the query results.

Step 2. Apply search criteria

Category	Field Name	Operator	Value	Edit	Delete
{0} Study	User Study ID	Equal	LODRIV98	Edit	Delete
{1} Sample	Field Activity Lower Depth	Greater Than	0.09	Edit	Delete
{2} Sample	Field Activity Depth UOM	Equal	meters	Edit	Delete
{3} Sample	Field Activity Lower Depth	Less Than	0.15	Edit	Delete
{4} Sample	Field Activity Depth UOM	Equal	meters	Edit	Delete
{5} Result	Result Parameter Name	Equal	Arsenic	Edit	Delete

Add Criteria

{0} AND {1} AND {2} AND {3} AND {4} AND {5}

Check

User Study ID = 'LODRIV98' AND Field Activity Lower Depth > 0.09 AND Field Activity Depth UOM = 'meters' AND Field Activity Lower Depth < 0.15 AND Field Activity Depth UOM = 'meters' AND Result Parameter Name = 'Arsenic'

Done

12.9

MyEIM Portal :: Portal Application Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimQuery/Default.aspx?type=chemistry&psk=17r3tm1dnj2x5hvdcb3qdgxa45&mode=copy&datagroupid=8

Study Type
Study QA Planning Level
Study QA Assessment Level
Study Start Date
Study End Date
Responsible Entity
Study Ecology Contact
Study Grant/Loan Number
Study Area Name
Study Area Description
Study Area Type
Study Result Description
Study QA Project Plan Description

< Remove
Move up >
Move down >

Sample ID
Sample Matrix
Sample Source
Result Parameter Name
Result Date
Result Reported Value
Result Value UOM
Result Measurement Basis Code
Result Data Qualifier
Result Method
Result Lab Name
Latitude Decimal Measure
Longitude Decimal Measure

☐ Include only 'Synoptic Samples' in the query results.

Step 2. Apply search criteria

Category	Field Name	Operator	Value	Edit	Delete
{0} Sample	Sample Type Code	Equal	Marine sediment	Edit	Delete
{1} Location	Location Type	Equal	Stream/River, Pool	Edit	Delete
{2} Location	Location Type	Equal	Stream/River, Riffle	Edit	Delete
{3} Location	Location Type	Equal	Stream/River, Channel	Edit	Delete
{4} Location	Location Type	Equal	Lake/Pond/Reservoir	Edit	Delete
{5} Location	Location Type	Equal	Stream/River	Edit	Delete
{6} Location	Location Type	Equal	Stream/River, Non-Channel	Edit	Delete
{7} Sample	Sample Matrix	Equal	Solid/Sediment	Edit	Delete
{8} Sample	Sample Source	Equal	Freshwater Sediment	Edit	Delete

Add Criteria

{0} AND ({1} OR {2} OR {3} OR {4} OR {5} OR {6}) AND {7} AND {8}

Check

Sample Type Code = 'Marine sediment' AND (Location Type = 'Stream/River, Pool' OR Location Type = 'Stream/River, Riffle' OR Location Type = 'Stream/River, Channel' OR Location Type = 'Lake/Pond/Reservoir' OR Location Type = 'Stream/River' OR Location Type = 'Stream/River, Non-Channel') AND Sample Matrix = 'Solid/Sediment' AND Sample Source = 'Freshwater Sediment'

Done

12.10

My EIM : MyEim Home - Default Home Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimPortal/Default.aspx?psk=171cvg1ue4nhgvzbzyv12dh55

Department of Ecology

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Environmental Information Management System

My EIM Home Custom Search Analysis Work Item Report

EIM > My EIM > Default Home Page

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[Bioassay](#)

Analysis
[Chemistry](#)

Utilities
[Cleanup Values](#)
Manage Derived Variables

Custom Groups
[Location](#)
[Chemical](#)
[Taxon](#)

My Custom Searches

Name	Description	Created Date	Last Modified
PSDDA_95	PSDDA_95	3/6/2007	3/6/2007
LODRIV98ByDepth	LODRIV98 Depth selected	3/14/2007	3/14/2007
LODRIV98	LODRIV98	3/14/2007	3/14/2007
all TSP As NK	all TSP Arsenic data	3/19/2007	3/19/2007
BellingHam	BellingHam Studies	3/29/2007	3/29/2007

Search Term:

Name	Description	Created Date	Last Modified
Marine_Sediment_Samples	Marine Sediment Samples.	3/7/2007	3/7/2007
Freshwater_Sediment_Samples	Freshwater Sediment Samples.	5/1/2007	5/1/2007

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Local intranet

12.11

My EIM : MyEim Home - Default Home Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimPortal/default.aspx?psk=171d9c47eb6-9c7c-4e85-b527-bad3b57eb2b5

Share Search With:

Share Search:

Close

----Pick a User----

- Harter, Troy
- Heiser, Michael
- Holland, Bradley
- Jullo, EJ
- Kannadaguli, Nagesha
- Knackstedt, Sylvs
- Lei, Betty
- Lee, Fu-Shin
- McCormack, Craig
- McMillan, Russ
- Moore, Randy

Done

Local intranet

12.12

My EIM - MyEim Home - Default Home Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimPortal/default.aspx?pek=171d9c47eb6-9c7c-4e85-b527-bad3b57eb2b5

EIM > My EIM > Default Home Page

Welcome: Nagesha Kannadaguli

Custom Search

[Chemistry](#)
[Bioassay](#)

Analysis
[Chemistry](#)

Utilities
[Cleanup Values](#)
Manage Derived Variables

Custom Groups
[Location](#)
[Chemical](#)
[Taxon](#)

My Custom Searches

Name	Description	Created Date	Last Modified
PSDDA_95	PSDDA_95	3/6/2007	3/6/2007
LODRIV98ByDepth	LODRIV98 Depth selected	3/14/2007	3/14/2007
LODRIV98	LODRIV98	3/14/2007	3/14/2007
all TSP As NK 3192007	All TSP Arsenic data	3/19/2007	3/19/2007
BellingHam	Bellingham Studies	3/29/2007	3/29/2007

Search Templates

Name	Description	Created Date	Last Modified
Marine_Sediment_Samples	Marine Sediment Samples.	3/7/2007	3/7/2007
Freshwater_Sediment_Samples	Freshwater Sediment Samples.	5/1/2007	5/1/2007

Shared Searches

Name	Description	Created Date	Last Modified
LODRIV98	LODRIV98	3/14/2007	3/14/2007

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12.13

EIM Query System - GIS Viewer - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://ecyde.asp/eimreporting/GISViewer/Viewer.asp?strSessionID=171r3tm1drj2x5hvb3cdgxa45&appMode=myeimgroup

Department of Ecology
INTRANET

EIM Map Viewer

Environmental Information Management System

Show List | Map Search | Layers

Select Polygon Tool

Select EIM locations by drawing a polygon shape.

Step 1) Select locations by drawing a polygon shape around them. Click the left mouse button at each angle point on the polygon boundary. Any location enclosed by the polygon will be selected.

Step 2) When finished drawing the polygon, double-click the left mouse button to close the polygon and select enclosed locations.

* To erase the selection polygon without selecting any locations, click the right mouse button.

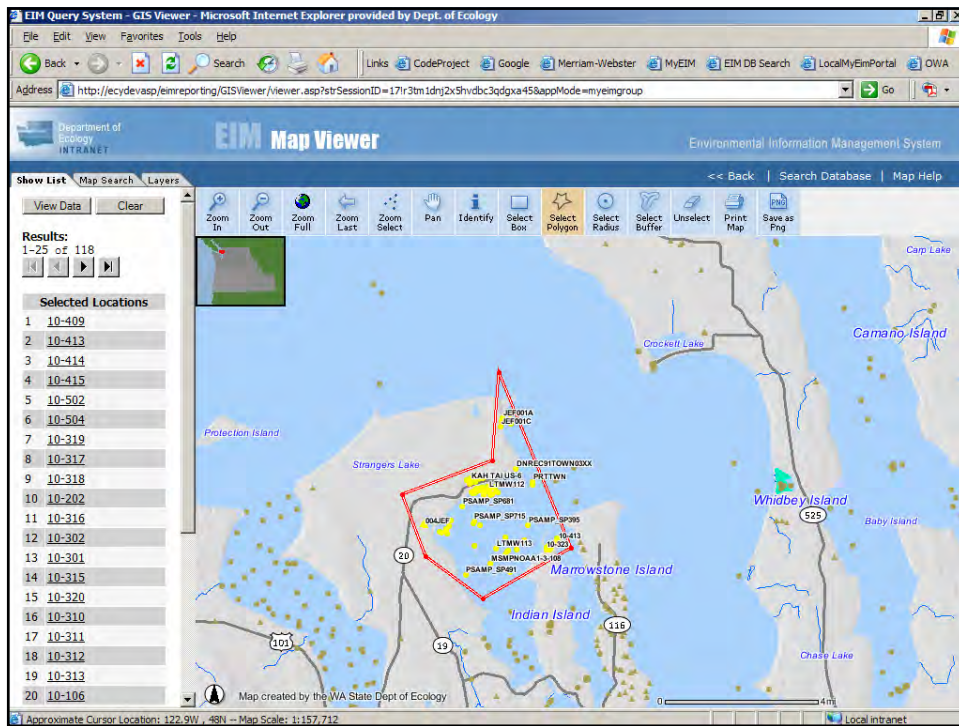
☐ Make selection from my currently selected stations.

Custom Polygon Tool

Map created by the WA State Dept of Ecology

Approximate Cursor Location: 122.8W, 48.1N - Map Scale: 1:157,712

12.14

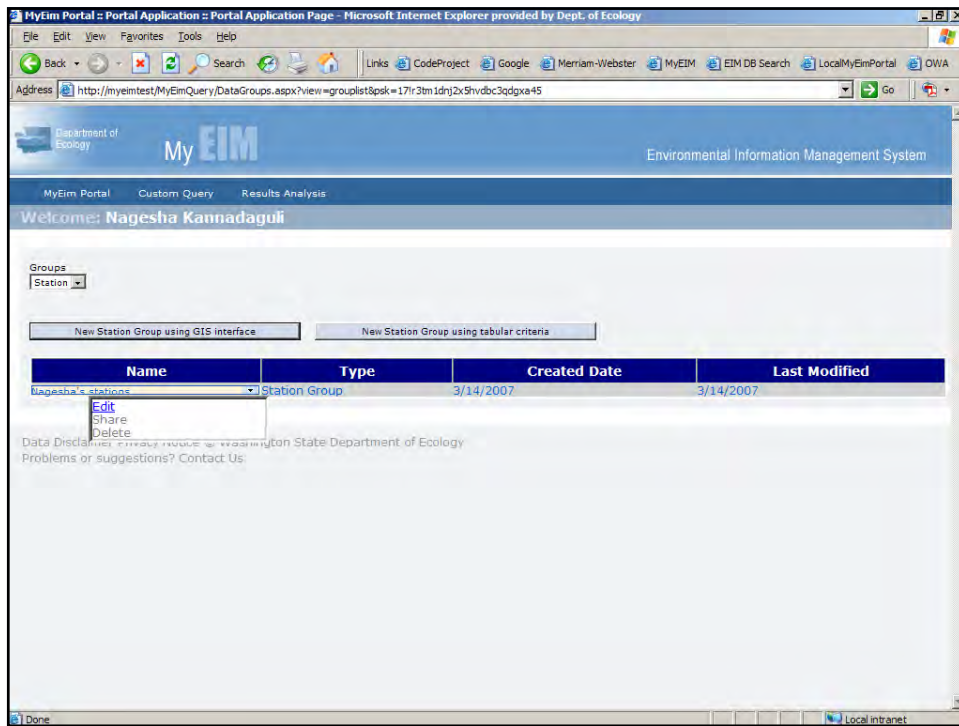


12.15

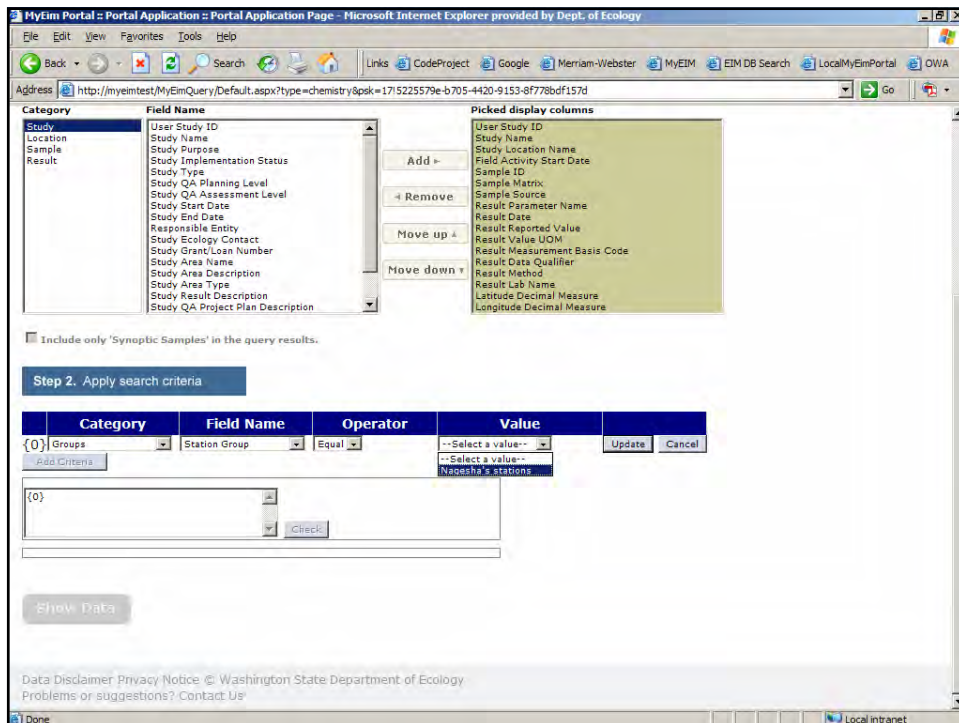
The screenshot shows the MyEIM Portal interface. The browser title is "MyEIM Portal : Portal Application : Portal Application Page - Microsoft Internet Explorer provided by Dept. of Ecology". The address bar shows a URL starting with "http://myeimtest/MyEimQuery/DataGroups.aspx?". The interface includes a "Department of Ecology MyEIM" logo and "Environmental Information Management System" title. A navigation bar shows "MyEim Portal", "Custom Query", and "Results Analysis". A welcome message "Welcome: Nagesha Kannadaguli" is displayed. Below it, there is a "Back to Groups list" button. A form titled "Station Group (GIS)" has fields for "Name" (containing "Nagesha's stations") and "Description" (containing "PMT meeting Demo stations"). There are buttons for "Save My Station Group (GIS)" and "Edit station group from the map". At the bottom, a table lists data for various user studies.

User Study ID	User Location ID	Location Key ID
2MARINAS	2MAINASPTTW16XX	4088760
2MARINAS	2MAINASPTTW12XX	6303397
2MARINAS	2MAINASPTTW03XX	9026798
2MARINAS	2MAINASPTTW18XX	10693531
2MARINAS	2MAINASPTTW17XX	14084164
2MARINAS	2MAINASPTTW08XX	16941801
2MARINAS	2MAINASPTTW10XX	94991248
2MARINAS	2MAINASPTTW11XX	97072609
2MARINAS	2MAINASPTTW04XX	58404871
2MARINAS	2MAINASPTTW06XX	80418264
2MARINAS	2MAINASPTTW20XX	81304526
2MARINAS	2MAINASPTTW01XX	81337415

12.16



12.17



12.18

My EIM = MyEIM Home = Default Home Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimPortal/Default.aspx?pk=171cvg1ue4rhgzbzyv12dh55

Department of Ecology
My EIM
Environmental Information Management System

My EIM Home Custom Search Analysis Work Item Report

EIM > My EIM > Default Home Page

Welcome: Nagesha Kannadaguli

Custom Search
Chemistry
Biossavy

Analysis
Chemistry

Utilities
Cleanup Values
Manage Derived Variables

Custom Groups
Location
Chemical
Taxon

My Custom Searches

Name	Description	Created Date	Last Modified
PSDDA_95	PSDDA_95	3/6/2007	3/6/2007
LODRIV98ByDepth	LODRIV98 Depth selected	3/14/2007	3/14/2007
LODRIV98	LODRIV98	3/14/2007	3/14/2007
all TSP As NK	all TSP Arsenic data	3/19/2007	3/19/2007
BellingHam	BellingHam Studies	3/29/2007	3/29/2007

Search Term: Edit Run Delete Save As Share

Name	Description	Created Date	Last Modified
Marine_Sediment_Samples	Marine Sediment Samples.	3/7/2007	3/7/2007
Freshwater_Sediment_Samples	Freshwater Sediment Samples.	5/1/2007	5/1/2007

Shared Searches
No searches saved.

EIM NEWS

New Analysis Tools
Analyze data, compare with cleanup values
[edit](#) 3/21/2007

New Custom Search
Create your own search and filter data
[edit](#) 3/21/2007

Release Notes
Feature Summary This:
[edit](#) 5/1/2007
[add article](#)

MY EIM HELP

Custom Search
Getting started

Analyzing Data
Tips and tricks

Custom Groups
Accessing your groups

http://myeimtest/MyEimQuery/Default.aspx?type=chemistry&pk=171cvg1ue4rhgzbzyv12dh55&mode=execute&dstagroupid=75 Local intranet

12.19

My EIM = Portal Application = Portal Application Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimQuery/SearchList.aspx?type=chemistry&mode=Execute&pk=171cvg1ue4rhgzbzyv12dh55

Department of Ecology
My EIM
Environmental Information Management System

My EIM Home Custom Search Analysis Work Item Report

Welcome: Nagesha Kannadaguli

Analyze Data Go to Map Edit Query Save Results as Station Group Download


49656 records found. Page 1 of 497 [Next](#) [Last](#)

User Study ID	Study Name	Study Location Name	Field Activity Start Date	Sample ID	Sample Matrix	Sample Source	Result Parameter Name	Result Date	Result Value	Result Value UOM	Result Measurement Basis Code	Res Dat Qua
LODRIV98	Lower Duwamish River - Site Inspection	DR057	08/31/1998	SD-057-0000	Solid/Sediment	Salt/Marine Sediment	Total Organic Carbon	08/31/1998	1.790000	%	dry	
LODRIV98	Lower Duwamish River - Site Inspection	DR057	08/31/1998	SD-057-0000	Solid/Sediment	Salt/Marine Sediment	Particle/Grain Size, Gravel	08/31/1998	0.380000	%	dry	
LODRIV98	Lower Duwamish River - Site Inspection	DR057	08/31/1998	SD-057-0000	Solid/Sediment	Salt/Marine Sediment	Particle/Grain Size, Sand	08/31/1998	37.220000	%	dry	
LODRIV98	Lower Duwamish River - Site Inspection	DR057	08/31/1998	SD-057-0000	Solid/Sediment	Salt/Marine Sediment	Aluminum	08/31/1998	22700.000000	ppm	dry	

Data Disclaimer Privacy Notice Washington State Department of Ecology


Done Local intranet

12.20




Cleanup Standards

43 SEDQUAL parameters
56 CLARC parameters
** User defined parameters



Derived Variables

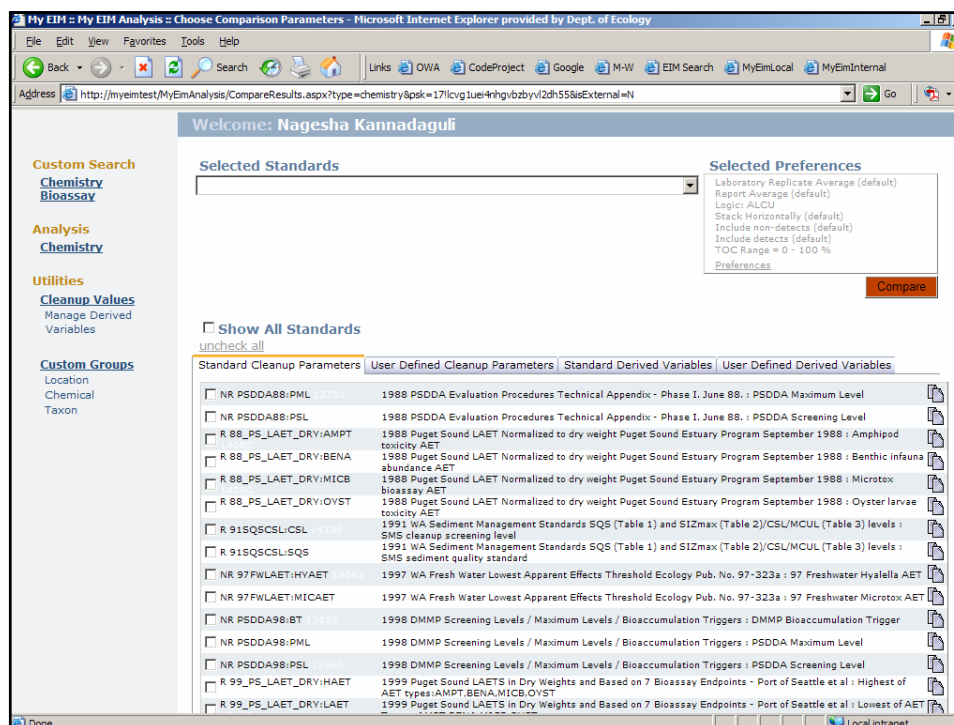
BFA , PCB, LPAH, HPAH, cPAH
25 new TEF Weighted DVs



User defined DVs

Share your CUPs and DVs.

12.21



Standard Cleanup Parameters	User Defined Cleanup Parameters	Standard Derived Variables	User Defined Derived Variables
<input type="checkbox"/> NR PSDDA88:PML		1988 PSDDA Evaluation Procedures Technical Appendix - Phase I, June 88. : PSDDA Maximum Level	
<input type="checkbox"/> NR PSDDA88:PSL		1988 PSDDA Evaluation Procedures Technical Appendix - Phase I, June 88. : PSDDA Screening Level	
<input type="checkbox"/> R 88_PS_LAET_DRY:AMPT		1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Amphipod toxicity AET	
<input type="checkbox"/> R 88_PS_LAET_DRY:BENA		1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Benthic infauna abundance AET	
<input type="checkbox"/> R 88_PS_LAET_DRY:MICB		1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Microtox bioassay AET	
<input type="checkbox"/> R 88_PS_LAET_DRY:OVST		1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Oyster larvae toxicity AET	
<input type="checkbox"/> R 91SQSCSL:CSL		1991 WA Sediment Management Standards SQS (Table 1) and SIZmax (Table 2)/CSL/MCUL (Table 3) levels : SMS cleanup screening level	
<input type="checkbox"/> R 91SQSCSL:SQS		1991 WA Sediment Management Standards SQS (Table 1) and SIZmax (Table 2)/CSL/MCUL (Table 3) levels : SMS sediment quality standard	
<input type="checkbox"/> NR 97FWLAET:HYAET		1997 WA Fresh Water Lowest Apparent Effects Threshold Ecology Pub. No. 97-323a : 97 Freshwater Hyalella AET	
<input type="checkbox"/> NR 97FWLAET:MICAET		1997 WA Fresh Water Lowest Apparent Effects Threshold Ecology Pub. No. 97-323a : 97 Freshwater Microtox AET	
<input type="checkbox"/> NR PSDDA98:BT		1998 DMMP Screening Levels / Maximum Levels / Bioaccumulation Triggers : DMMP Bioaccumulation Trigger	
<input type="checkbox"/> NR PSDDA98:PML		1998 DMMP Screening Levels / Maximum Levels / Bioaccumulation Triggers : PSDDA Maximum Level	
<input type="checkbox"/> NR PSDDA98:PSL		1998 DMMP Screening Levels / Maximum Levels / Bioaccumulation Triggers : PSDDA Screening Level	
<input type="checkbox"/> R 99_PS_LAET_DRY:HAET		1999 Puget Sound LAETS in Dry Weights and Based on 7 Bioassay Endpoints - Port of Seattle et al : Highest of AET types:AMPT,BENA,MICB,OVST	
<input type="checkbox"/> R 99_PS_LAET_DRY:LAET		1999 Puget Sound LAETS in Dry Weights and Based on 7 Bioassay Endpoints - Port of Seattle et al : Lowest of AET	

12.22

My EIM : My EIM Analysis - Choose Comparison Parameters - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeintest/MyEimAnalysis/CompareResults.aspx?type=chemistry&psk=171cvg1ue4rhgzbzyvl2dh558uExternal=N

Analysis Criteria

Aggregation

☒ Laboratory Replicate Average ☐ One value per sample ☐ One value per station

Result Reporting Mode

☒ Average ☐ Maximum ☐ Latest

Stack Exceedances as

☒ Columns ☐ Rows

Exclude

☐ Non-Detects ☐ Detects

TOC Range

Min: Max: (Values have to be between 1 and 100)

OK Cancel

12.23

My EIM : My EIM Analysis - Choose Comparison Parameters - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeintest/MyEimAnalysis/CompareResults.aspx?type=chemistry&psk=171cvg1ue4rhgzbzyvl2dh558uExternal=N

Welcome: Nagesha Kannadaguli

Selected Standards

1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU
1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU

Selected Preferences

Laboratory Replicate Average (default)
Report Average (default)
Logic: ALCU
Stack Horizontally (default)
Include non-detects (default)
Include detects (default)
TOC Range = 0 - 100 %
Preferences

Compare

Show All Standards

uncheck all

Standard Cleanup Parameters User Defined Cleanup Parameters Standard Derived Variables User Defined Derived Variables

<input type="checkbox"/> NR PSDDA88:PML	1988 PSDDA Evaluation Procedures Technical Appendix - Phase I, June 88. : PSDDA Maximum Level	
<input type="checkbox"/> NR PSDDA88:PSL	1988 PSDDA Evaluation Procedures Technical Appendix - Phase I, June 88. : PSDDA Screening Level	
<input type="checkbox"/> R 88_PS_LAET_DRY:AMPT	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Amphipod toxicity AET	
<input type="checkbox"/> R 88_PS_LAET_DRY:BENA	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Benthic infauna abundance AET	
<input type="checkbox"/> R 88_PS_LAET_DRY:MICB	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Microtox bioassay AET	
<input type="checkbox"/> R 88_PS_LAET_DRY:OVST	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Oyster larvae toxicity AET	
<input checked="" type="checkbox"/> R 91SQSCSL:CSL	1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU (Table 3) levels : SMS cleanup screening level	
<input checked="" type="checkbox"/> R 91SQSCSL:SQS	1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU (Table 3) levels : SMS sediment quality standard	
<input type="checkbox"/> NR 97FWLAET:HYAET	1997 WA Fresh Water Lowest Apparent Effects Threshold Ecology Pub. No. 97-323a : 97 Freshwater Hyalella AET	
<input type="checkbox"/> NR 97FWLAET:MICAET	1997 WA Fresh Water Lowest Apparent Effects Threshold Ecology Pub. No. 97-323a : 97 Freshwater Microtox AET	
<input type="checkbox"/> NR PSDDA98:BT	1998 DMMP Screening Levels / Maximum Levels / Bioaccumulation Triggers : DMMP Bioaccumulation Trigger	
<input type="checkbox"/> NR PSDDA98:PML	1998 DMMP Screening Levels / Maximum Levels / Bioaccumulation Triggers : PSDDA Maximum Level	
<input type="checkbox"/> NR PSDDA98:PSL	1998 DMMP Screening Levels / Maximum Levels / Bioaccumulation Triggers : PSDDA Screening Level	
<input type="checkbox"/> R 99_PS_LAET_DRY:HAET	1999 Puget Sound LAETs in Dry Weights and Based on 7 Bioassay Endpoints - Port of Seattle et al : Highest of AET types:AMPT,BENA,MICB,OVST	
<input type="checkbox"/> R 99_PS_LAET_DRY:LAET	1999 Puget Sound LAETs in Dry Weights and Based on 7 Bioassay Endpoints - Port of Seattle et al : Lowest of AET	

12.24

My EIM : My EIM Analysis - Choose Comparison Parameters - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeintest/MyEIMAnalysis/CompareResults.aspx?type=chemistry&psk=171cvg1uei4rhgzbzyv12dh558aExternal=N

☐ R_Nat'l Bkg_Metals_50th %ile Soil - Natural Background - Metals Concentrations - 50th Percentile

☐ R_Nat'l Bkg_Metals_90th %ile Soil - Natural Background - Metals Concentrations - 90th Percentile

☐ R_Nat'l Bkg_Metals_Mean Soil - Natural Background - Metals Concentrations - mean

☐ R_Nat'l Bkg_Metals_Median Soil - Natural Background - Metals Concentrations - median

☐ R_Soil_Meth_A_Industrial Soil, Method A, Industrial Land Use, Table Value

☐ R_Soil_Meth_A_Unrestricted Soil, Method A, Unrestricted Land Use, Table Value

☐ R_Soil_Meth_B_Carc Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use

☐ R_Soil_Meth_B_Non Carc Soil, Method B, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), unrestricted land use

☐ R_Soil_Meth_C_Carc Soil, Method C, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use

☐ R_Soil_Meth_C_Non Carc Soil, Method C, Non-carcinogen, Standard Formula Value, Direct Contact (ingestion only), industrial land use

1991 WA Sediment Management Standards SQS (Table 1) and SiZmax (Table 2)/CSL/MCUL (Table 3) levels : SMS cleanup screening level

Constituent	Unit Of Measure	Measurement Basis	Concentration	Comments
benzyl alcohol	ppb	DRY	73.00	
benzo(g,h,i)perylene	ppm	TOC	78.00	
butyl benzyl phthalate	ppm	TOC	64.00	
cadmium in water	ppm	DRY	6.70	
chromium (total)	ppm	DRY	270.00	
chrysene	ppm	TOC	460.00	
copper	ppm	DRY	390.00	
diethyl phthalate	ppm	TOC	110.00	
dibenzofuran	ppm	TOC	58.00	
di-butyl phthalate	ppm	TOC	1,700.00	
dimethyl phthalate	ppm	TOC	53.00	
fluoranthene	ppm	TOC	1,200.00	
fluorene	ppm	TOC	79.00	
High Molecular Weight Polycyclic Aromatic Hydrocarbons (HPAH)	ppm	TOC	5,300.00	
indeno[1,2,3-cd]pyrene	ppm	TOC	88.00	
lead	ppm	DRY	530.00	
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (LPAH)	ppm	TOC	780.00	
mercury	ppm	DRY	0.59	
naphthalene	ppm	TOC	176.00	
nitrosodiphenylamine/N-	ppm	TOC	11.00	

Show page: 1 2 3 (Total Records: 47) Records Per Page: 20

12.25

My EIM : My EIM Analysis - Choose Comparison Parameters - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeintest/MyEIMAnalysis/CompareResults.aspx?type=chemistry&psk=171cvg1uei4rhgzbzyv12dh558aExternal=N

EIM > My EIM > My EIM Analysis > Choose Comparison Parameters

Welcome: Nagesha Kannadaguli

Custom Search
Chemistry
Bioassay

Analysis
Chemistry

Utilities
Cleanup Values
Manage Derived Variables

Custom Groups
Location
Chemical
Taxon

Selected Standards
1991 WA Sediment Management Standards SQS (Table 1) and SiZmax (Table 2)/CSL/MCU
1991 WA Sediment Management Standards SQS (Table 1) and SiZmax (Table 2)/CSL/MCU
My 1991 WA Sediment Management Standards SQS (Table 1) and SiZmax (Table 2)/CSL/MCU

Selected Preferences
Laboratory Replicate Average (default)
Report Average (default)
Logic: ALCU
Stack Horizontally (default)
Include non-detects (default)
Include detects (default)
TOC Range = 0 - 100 %
Preferences

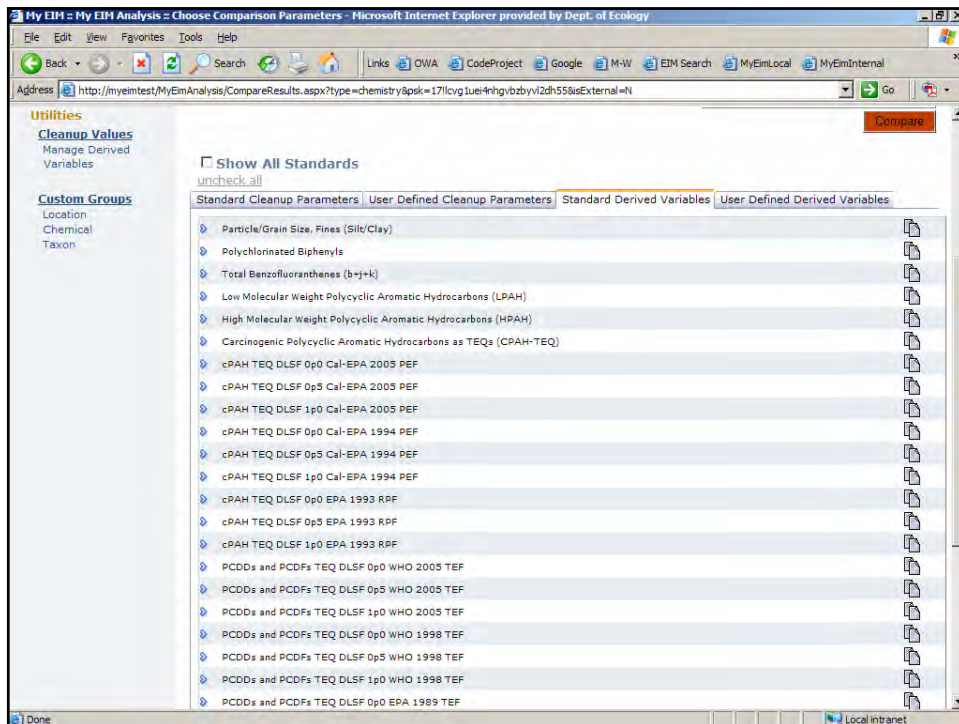
☐ Show All Standards
uncheck all

Standard Cleanup Parameters | User Defined Cleanup Parameters | Standard Derived Variables | User Defined Derived Variables

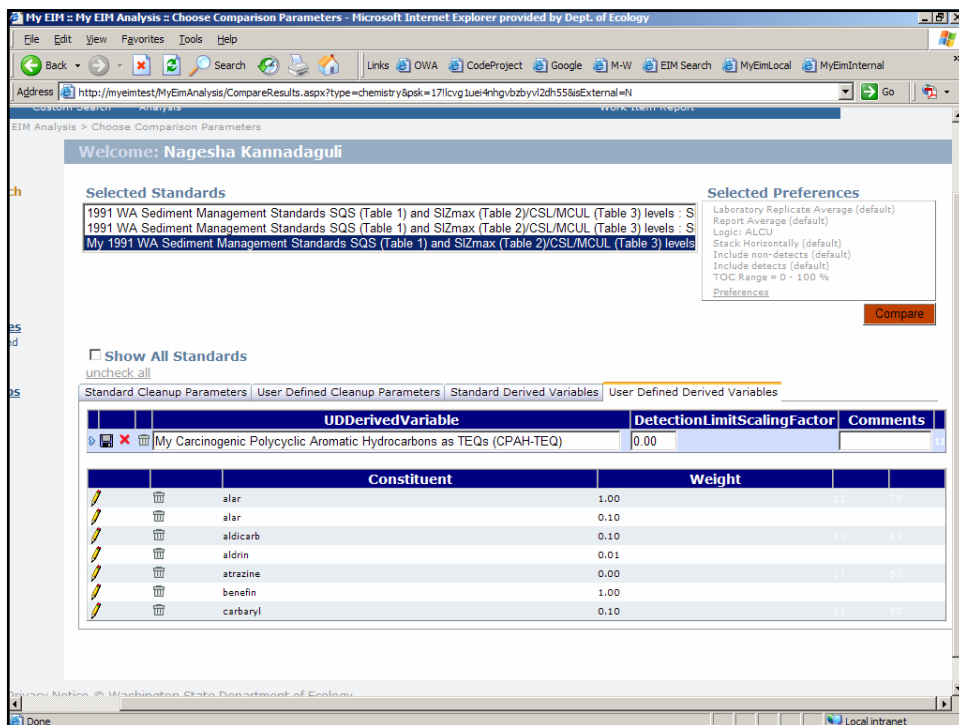
☒ My 1991 WA Sediment Management Standards SQS (Table 1) and SiZmax (Table 2)/CSL/MCU (Table 3) levels : SMS cleanup screening level

Constituent	Unit Of Measure	Measurement Basis	Concentration	Comments
benzomyl	ppm	toc	2.30	12-231
cyclohexylamine	ppm	toc	1.80	
bentazon	ppm	toc	9.00	12-231
di(2-ethylhexyl)adipate	ppb	dry	29.00	
benefin	ppm	toc	33.00	12-231
benefin	ppm	toc	64.00	
benefin	ppb	dry	63.00	12-231
biphenyl:1,1-	ppm	toc	4,500.00	
aniline	ppb	dry	670.00	12-231
chlorobenzene	ppb	dry	690.00	
calcium cyanide	ppm	toc	2.30	12-231
calcium cyanide	ppm	toc	6.20	
benzoic acid	ppm	toc	110.00	12-231

12.26



12.27



12.28

MyEIM Portal - Portal Application Page - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimQuery/SearchList.aspx?type=chemistry&mode=Execute&psk=171527fd5c6-efbf-49ed-b2e2-45b0643709b5

Department of Ecology
MyEIM
Environmental Information Management System

MyEIM Portal Custom Query Results Analysis

Welcome: Nagesha Kannadaguli

Analyze Data Go to Map Edit Query Download

50018 records found. Page 1 of 501

User Study ID	Study Name	Study Location Name	Field Activity Start Date	Sample ID	Sample Matrix	Sample Source	Result Parameter Name	Result Date	Result Reported Value	Result Value UOM	Result Measurement Basis Code	Result Data Quality
LODRIV98	Lower Duwamish River - Site Inspection	LODRIV98DR08608/31/1998	SD-086-0000	Solid/Sediment	Salt/Marine Sediment	Particle/Grain Size, Gravel	08/31/1998	0.34	%		dry	
LODRIV98	Lower Duwamish River - Site Inspection	LODRIV98DR08608/31/1998	SD-086-0000	Solid/Sediment	Salt/Marine Sediment	Particle/Grain Size, Sand	08/31/1998	13.77	%		dry	JT
LODRIV98	Lower Duwamish River - Site Inspection	LODRIV98DR08608/31/1998	SD-086-0000	Solid/Sediment	Salt/Marine Sediment	Total Organic Carbon	08/31/1998	1.97	%		dry	
LODRIV98	Lower Duwamish River - Site Inspection	LODRIV98DR08608/31/1998	SD-086-0000	Solid/Sediment	Salt/Marine Sediment	Particle/Grain Size, Fines (Silt/Clay)	08/31/1998	85.89	%		dry	JT
LODRIV98	Lower Duwamish River - Site Inspection	LODRIV98DR08608/31/1998	SD-086-0000	Solid/Sediment	Salt/Marine Sediment	Aluminum	08/31/1998	27200	ppm		dry	

Local intranet

12.29

MyEIM - MyEIM Analysis - Choose Comparison Parameters - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimAnalysis/CompareResults.aspx?type=chemistry&psk=171cvg1ue4nhygzbzyv12dh558aExternal=N

Department of Ecology
MyEIM
Environmental Information Management System

MyEIM Home Custom Search Analysis Work Item Report

ETM > MyEIM > MyEIM Analysis > Choose Comparison Parameters

Welcome: Nagesha Kannadaguli

Custom Search
Chemistry
Bioassay

Analysis
Chemistry

Utilities
Cleanup Values
Manage Derived Variables

Custom Groups
Location
Chemical
Taxon

Selected Standards

1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU

1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU

Selected Preferences

Laboratory Replicate Average (default)
Report Average (default)
Logic: ALCU
Stack Horizontally (default)
Include non-Detects (default)
Include detects (default)
TOC Range = 0 - 100 %

Compare

☐ Show All Standards
[uncheck all](#)

Standard Cleanup Parameters User Defined Cleanup Parameters Standard Derived Variables User Defined Derived Variables

<input type="checkbox"/> NR PSDDA88:PML	1988 PSDDA Evaluation Procedures Technical Appendix - Phase I, June 88 : PSDDA Maximum Level
<input type="checkbox"/> NR PSDDA88:PSL	1988 PSDDA Evaluation Procedures Technical Appendix - Phase I, June 88 : PSDDA Screening Level
<input type="checkbox"/> R 88_PS_LAET_DRY:AMPT	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Amphipod toxicity AET
<input type="checkbox"/> R 88_PS_LAET_DRY:BENA	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Benthic infauna abundance AET
<input type="checkbox"/> R 88_PS_LAET_DRY:MICB	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Microtox bioassay AET
<input type="checkbox"/> R 88_PS_LAET_DRY:OVST	1988 Puget Sound LAET Normalized to dry weight Puget Sound Estuary Program September 1988 : Oyster larvae toxicity AET
<input checked="" type="checkbox"/> R 91SQSCSL:CSL	1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU (Table 3) levels : SMS cleanup screening level
<input checked="" type="checkbox"/> R 91SQSCSL:SQS	1991 WA Sediment Management Standards SQS (Table 1) and SI2max (Table 2)/CSL/MCU (Table 3) levels : SMS sediment quality standard
<input type="checkbox"/> NR 97FWLAET:HYAET	1997 WA Fresh Water Lowest Apparent Effects Threshold Ecology Pub. No. 97-323a : 97 Freshwater Hyalella AET

Done

Local intranet

12.30

My EIM : My EIM Analysis : Analysis Results - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeiminternal/MyEIMAnalysis/DisplayResults.aspx?destPage=DisplayResults.aspx&psk=1715v5kx045b2nfa5nto5aapjv

Query Execution Time :00:00:11.1299211
Analysis Execution Time :00:01:46.7406655

Custom Search
Chemistry
Bioassay

Analysis
Chemistry

Utilities
Cleanup Values
Manage Derived Variables

Custom Groups
Location
Chemical
Taxon

Map Results Export Results Show/Hide Filter

Chemistry Analysis: Comparison Results (8830) Total records
Page 1 of 9 Previous Next

ResultIndex	UserStudyID	Station	SampleID	Date	SubSampleID	FieldReplicateID	TOC
Select24	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select25	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	S
Select26	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	L
Select27	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	H
Select28	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	A
Select29	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	C

Listing Options for Derived Variables
☒ All ☐ Not OK ☐ Selected

Derived Variables : Calculated Values (10535 records)
Page 1 of 11 Previous Next

ResultIndex	UserStudyID	Station	SampleID	Date	SubSampleID	FieldReplicateID	TOC
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P
Select20	LODRIV98	LODRIV98DR057SD-057-0000	8/31/1998			1.79	P

12.31

My EIM : My EIM Analysis : Analysis Results - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeiminternal/MyEIMAnalysis/DisplayResults.aspx?destPage=DisplayResults.aspx&psk=1715v5kx045b2nfa5nto5aapjv

Utilities
Cleanup Values
Manage Derived Variables

Custom Groups
Location
Chemical
Taxon

Page 1 of 9 Previous Next

Chemical	144_CleanupParameter	144_Criteria	144_UOM	144_Basis	144_NormalizedValue	144
Polycyclic Aromatic Hydrocarbons (PAH)	R 915QSCSL:CSL	780.000	ppm	toc	30.168	0.039
Polycyclic Aromatic Hydrocarbons (PAH)	R 915QSCSL:CSL	5300.000	ppm	toc	276.536	0.052

Listing Options for Derived Variables
☒ All ☐ Not OK ☐ Selected

Derived Variables : Calculated Values (10535 records)
Page 1 of 11 Previous Next

DV Name	CalculatedValue	UOM	Basis	DLSF	Comments	Chemical	Concn	Weight	WeightedCon
PCBs	10.000	ppm	toc	OK	areclor 1016	1.117	1.000		
PCBs	10.000	ppm	toc	OK	areclor 1221	2.235	1.000		
PCBs	10.000	ppm	toc	OK	areclor 1232	1.117	1.000		
PCBs	10.000	ppm	toc	OK	areclor 1242	1.229	1.000		
PCBs	10.000	ppm	toc	OK	areclor 1248	1.117	1.000		
PCBs	10.000	ppm	toc	OK	areclor 1254	3.296	1.000		
PCBs	10.000	ppm	toc	OK	areclor 1260	3.240	1.000		
PAH	30.168	ppm	toc	OK	naphthalene	1.676	1.000		
PAH	30.168	ppm	toc	OK	acenaphthylene	1.117	1.000		
PAH	30.168	ppm	toc	OK	acenaphthene	1.676	1.000		
PAH	30.168	ppm	toc	OK	fluorene	2.235	1.000		
PAH	30.168	ppm	toc	OK	phenanthrene	16.760	1.000		
PAH	30.168	ppm	toc	OK	anthracene	7.821	1.000		
HPAH	276.536	ppm	toc	Missing Constituents	fluoranthene	43.575	1.000		
				Total BFA used					

12.32

My EIM : My EIM Analysis : Analysis Results - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeiminternal/MyEIMAnalysis/DisplayResults.aspx?destPage=DisplayResults.aspx&pk=1715vSix045bZrta5ntoiaagpv

Utilities
Cleanup Values
Manage Derived Variables
Custom Groups
Location
Chemical
Taxon

SiteID	TOC	Chemical	144_CleanupParameter	144_Criteria	144_UOM	144_Basis	144_Normaliz
1.79		Hydrocarbons (LPAH)					
1.79		High Molecular Weight Polycyclic Aromatic Hydrocarbons (HPAH)	R 91SQSCSLCSL	5300.000	ppm	toc	276.536
1.79		Benzo(a)anthracene					
1.79		Carcinogenic Polycyclic Aromatic Hydrocarbons as TEQs (CPAH-TEQ)					
0.14		1,2,4-Trichlorobenzene	R 91SQSCSLCSL	1.800	ppm	toc	2.143
0.14		1,2-Dichlorobenzene	R 91SQSCSLCSL	2.300	ppm	toc	1.071
0.14		1,4-Dichlorobenzene	R 91SQSCSLCSL	9.000	ppm	toc	1.071
0.14		Benzo(a)anthracene					
0.14		Carbon Tetrachloride	R 91SQSCSLCSL	670.000	inh	drv	1.500

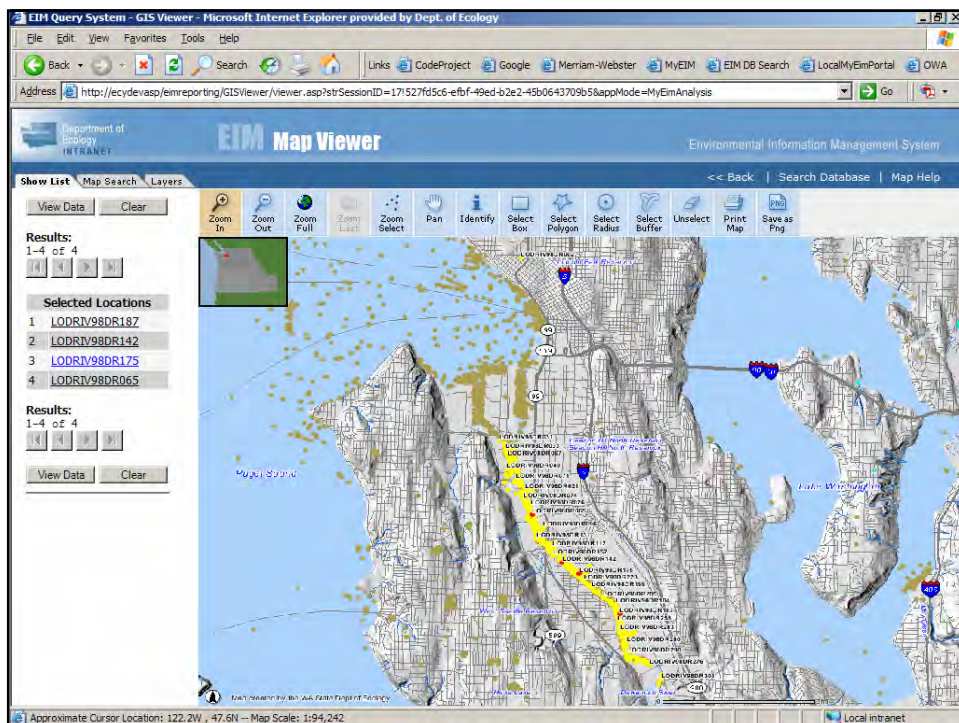
Listing Options for Derived Variables
☒ All ☐ Not OK ☐ Selected

Derived Variables : Calculated Values (10535 records)
Page 1 of 11 Previous Next

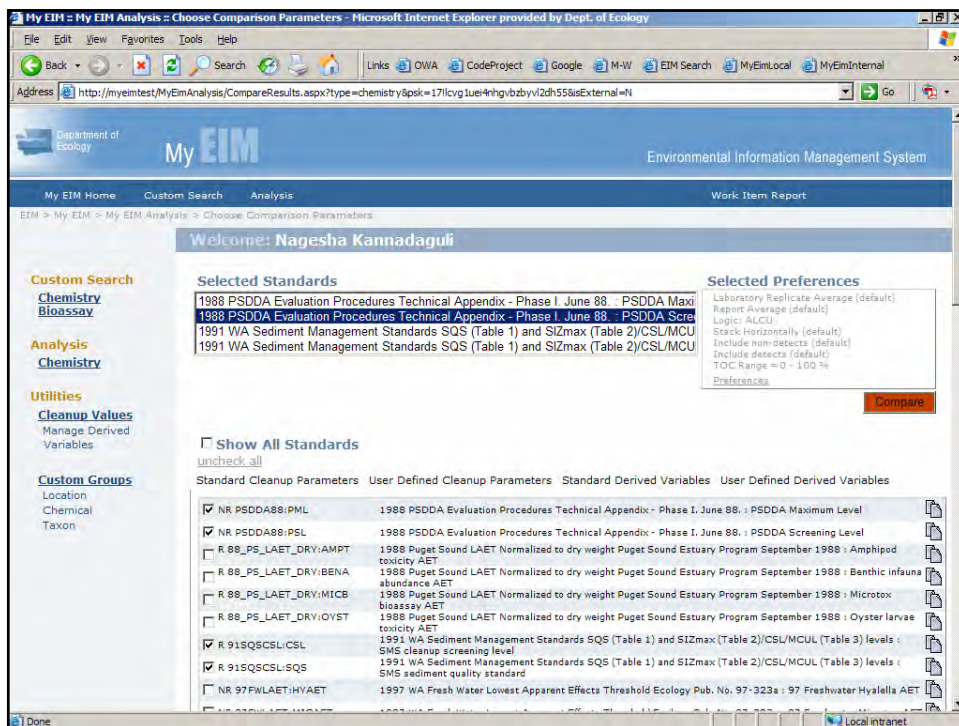
CalculatedValue	UOM	Basis	DLSF	Comments	Chemical	Concn	Weight	WeightedConcn	Contr
1030	ppb	dry		Missing Constituents	benzo[k]fluoranthene	450	1.000		43.69
723.180	ppb	dry	0.0	OK	benzo[a]pyrene	490	1.000	490.000	67.76
723.180	ppb	dry	0.0	OK	benzo[a]anthracene	450	0.100	45.000	6.22
723.180	ppb	dry	0.0	OK	benzo[b]fluoranthene	580	0.100	58.000	8.02
723.180	ppb	dry	0.0	OK	benzo[k]fluoranthene	450	0.010	4.500	0.62
723.180	ppb	dry	0.0	OK	chrysene	680	0.001	0.680	0.09
723.180	ppb	dry	0.0	OK	dibenzo[a,h]anthracene	90	1.000	90.000	12.45
723.180	ppb	dry	0.0	OK	indeno[1,2,3-cd]pyrene	350	0.100	35.000	4.84
28.571	ppm	toc		OK	aroclor 1016	14.286	1.000		
28.571	ppm	toc		OK	aroclor 1221	28.571	1.000		100

Local intranet

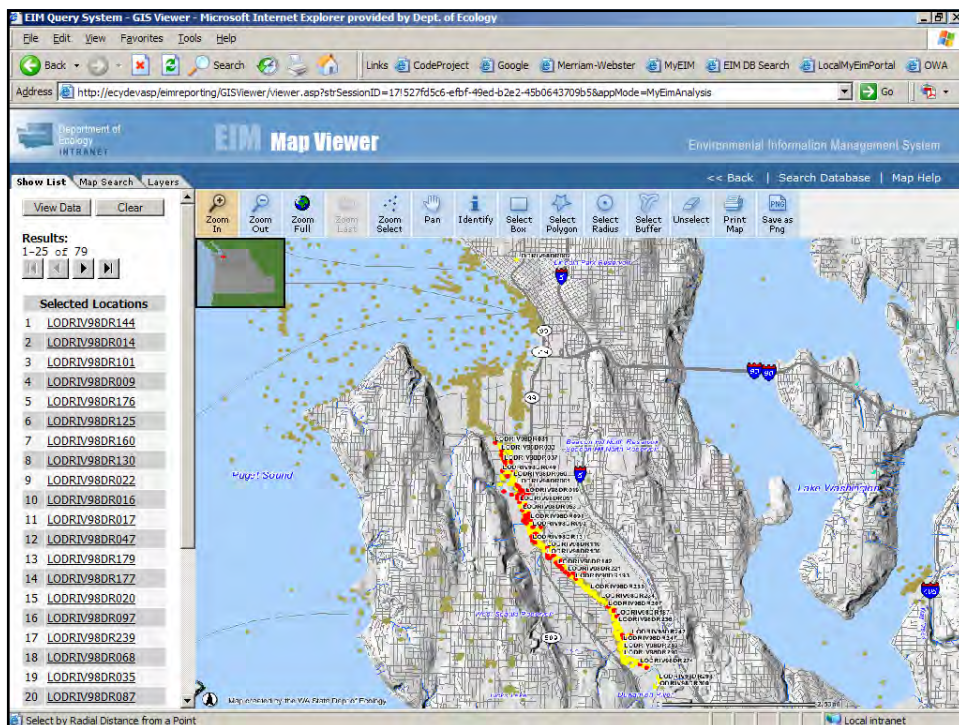
12.33



12.34



12.35



12.36

MyEIM Portal - My EIM Analysis - Analysis Results - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://myeimtest/MyEimAnalysis/DisplayResults.aspx?pk=171527fd5c6-efbf-49ed-b2e2-45b0643709b5

Field Name	Operator	Value
{0} ResultParameterName Equal		Hexachlorobenzene

Add Criteria

Revisable Filter Expression

{0}

Check expression

Generated Filter Sql
ResultParameterName = 'Hexachlorobenzene '

Apply Filter (333 records match the given filter criteria.)

Derived Variables : Calculated Values (35964 records)

UserStudyID	UserLocation	GeoLocation	SampleId
LODRIV98	LODRIV98DR092	940132	SD-092-0000 8/27/1998 0.7
LODRIV98	LODRIV98DR211	1016737	SD-211-0000 8/25/1998 1.56
LODRIV98	LODRIV98DR242	1727982	SD-242-00-CC 8/24/1998 3.5
LODRIV98	LODRIV98DR066	1875397	SD-066-0000 8/18/1998 2.25

Done Local intranet

12.37

EIM Query System - GIS Viewer - Microsoft Internet Explorer provided by Dept. of Ecology

Address: http://ecydevapp/emreporting/GISViewer/Viewer.aspx?SessionID=171527fd5c6-efbf-49ed-b2e2-45b0643709b5&appMode=MyEimAnalysis

Department of Ecology
INTRANET

EIM Map Viewer

Environmental Information Management System

Show List Map Search Layers

View Data Clear

Results: 1-25 of 296

Selected Locations

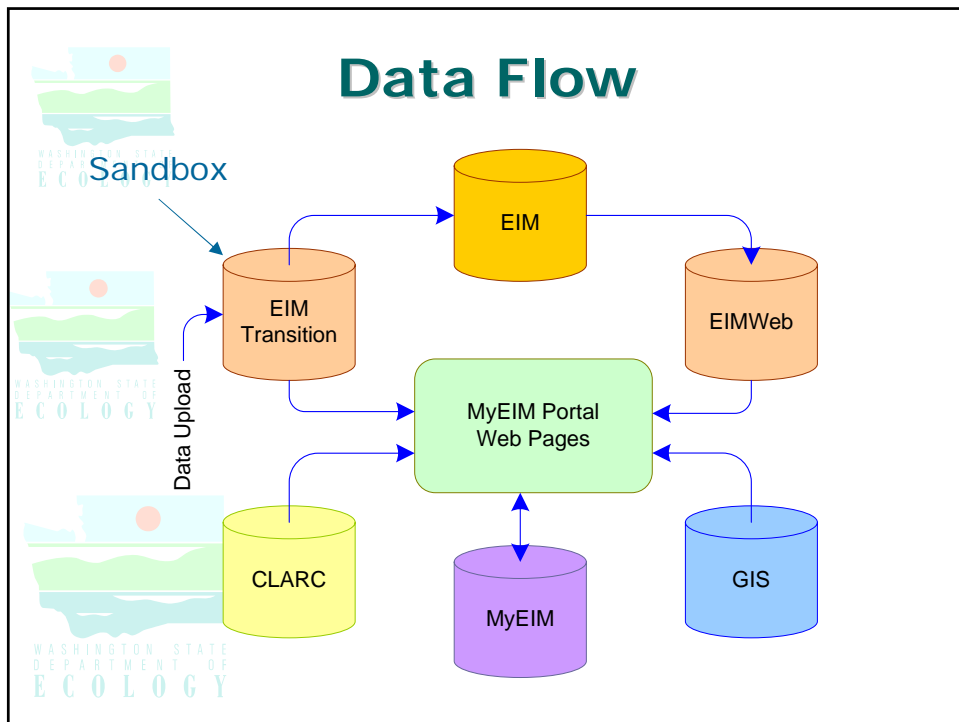
- LODRIV98DR234
- LODRIV98DR023
- LODRIV98DR145
- LODRIV98DR121
- LODRIV98DR257
- LODRIV98DR037
- LODRIV98DR064
- LODRIV98DR102
- LODRIV98DR139
- LODRIV98DR136
- LODRIV98DR051
- LODRIV98DR084
- LODRIV98DR231
- LODRIV98DR193
- LODRIV98DR162
- LODRIV98DR236
- LODRIV98DR140
- LODRIV98DR249
- LODRIV98DR298
- LODRIV98DR122

Map Viewers

Map Help

Save Map Image Local intranet

12.38



12.39



12.40



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